The Builder.

VOL. XXXIV. No. 1735. SATURDAY, SEPTEMBER 23.

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House and Home in the Heart of Town.

IN many parts of India at the present time may be observed social phases which serve to illustrate the domestic life of Mediæval Britain, as it is now known to us from historical and antiquarian researches. Among the plantations of Lower Bengal an Englishman's house is often isolated for a radius of thirty or forty miles from neighbours of the same race. The master, lord sometimes of a domain extending over 20,000 acres, dwells among a crowd of retainers. Butcher, baker, gardener, tailor and milliner, mason, carpenter, and smith, villages of tenants, and troops of labourers, surround the flat white house, in which, if its owner be respected, many a local dispute is adjusted by the great sahib. He is the centre of a social system, and numerous families minister to his wants. The stranger of his own nation who passes over his land is entertained as a welcome and valued guest. The daily repasts are partaken of almost in public. The different rooms in the house open into each other, and the doorways are often only closed by hanging drapery. The kitchens and offices are in a separate building at a distance from the house; but in the latter, in corners and alcoves, servants lie at night, sleeping—yet alert at the call of their master. At festive gatherings, when such houses are usually full of visitors, the number or the accommodation of dependents is as little important as it probably was in the castle of a feudal baron.

When in this country the like possession of a shelter implied to the majority of people almost similar dependence, the houses of the religious communities were school, workshop, and home, not only to different sorts and conditions of men, but also to their wives and families. Within the abbeys and priories lived bands of workers in every useful art. When these men threw off direct ecclesiastical control and set up for themselves, the monastic discipline to which they had been accustomed was preserved in the form of trade corporations; and the artistic traditions acquired within the walls of the cloister were perpetuated outside their old masters' domains. Houses spread around the hill upon which stood a fortress; the valley where a monastery lay embosomed became dotted with gables. As a rule each house was arranged for the accommodation of a single family; but before the sixteenth century, and, indeed, for a long time after, a family was an agglomeration of persons not necessarily of the same blood. Soldiers took service under the banner of particular nobles, and formed part of their retinue. In families of rank the sons of gentlemen—pages or apprentices of fashion—were attached to my lord's service; and young damsels of birth assisted at the toilette of my lady. The merchant's apprentice lived in his master's house; he did all the work of the shop, both professional and menial, and this custom still prevailed during the early part of the present century. Less than 150 years ago country squires sometimes kept a chaplain. A tutor is a dependent of recent times, and governesses still form part of even middle-class households. It is needless for our purpose to particularise the details of social development and change. A significant relic of early manners may yet be seen in the parlour of many a house, where a single comfortable arm-chair, surrounded by subordinate ones, marks the master's seat—to use which neither wife, dependent, nor even guest aspires or is invited.

To-day, however, men and women with education enough to fit them for posts in an office, a warehouse, or a shop will not take any kind of service in even great households. People of humble belongings aspire to work out life by themselves or more correctly in the company of wife and children alone. The nation recognises the desire for independence evinced by its immediate servants of the army and navy. Soldiers after a short term of service lodge at home; the Greenwich pensioner is not now subjected to the discipline of a Government almshouse. Nor are householders, at least in London, indisposed to join in the attainment of a self-same object; their horses and carriages, their plate, linen, and other similar articles are often hired. Common material objects are so modified as to individualise social comfort. Extensive ramifications of rooms and domestic offices are no longer required. Instead of a few large houses many small ones are wanted, and they must be relatively as well built as the old ones they supersede. The modern problem is, How to lodge the greatest number in separate tenements most profitably to all concerned? In the crowded centre of a metropolis the land is too valuable for small houses; it must be covered with lofty buildings of many stories; and since it is an accepted fact that the lower ones must be devoted to commercial purposes, only the upper portions remain available for residents. How such buildings ought to be arranged has been shown during the course of this century in the principal cities of Europe, and few Continental architects would now think of discussing a problem which in the English capital still remains unsolved.

In the majority of instances a Londoner lives out of London. He may be found in what he is pleased to distinguish as "town" an hour or so before noon and an hour or so after. He returns to his residence "out of town" to dine and sleep. In this respect the example set by the merchant and the professional man is now followed by the shop-owner. In the City the last-named can lease simply a shop; and although in the metropolis he is often compelled to take a whole house, he uses only the ground-story, except in rare cases where he requires large warehouse-room. The heart of town is thus fast becoming a place of business only, and is already principally composed of houses let out in shops, business-offices, and extemporised dwellings. The most fashionable and expensive squares are hemmed in by streets entirely devoted to commercial purposes. Mayfair as a residential quarter is decreasing in area year by year. To the west of Baker-street there is still a large neighbourhood devoted to private residences; to the west of Portland-place another; near the Foundling Hospital there are a few squares lined with excellent family homes. But the great mass of houses in London proper is inhabited by the poorer middle-classes, and in such neighbourhoods as those of which Clare-market is one centre and the Seven-dials another the very poorest of the population find comparatively expensive dwellings. This would be no detriment to the heart of town were the great mass of houses fitted to receive the tenants who occupy them, but on the contrary they are totally and in every respect unfitted for the purpose to which they are now devoted. This great mass of houses is made up of streets once residential and once even fashionable resorts, but now irretrievably and for ever fallen,—because by the London system of house arrangement a residential neighbourhood once deteriorated cannot recover itself even by re-building. Nor in the very heart of town does the completion of a new street improve the social character of the neighbourhood, for it brings neither occupiers of houses nor residents in the English acceptation of the term. On the contrary it brings the class and description of tenement already existing around it—the house inhabited, two or three generations back, by one family and converted by the present generation to the uses, not the wants, of several families. This is not difficult to describe. While, at the West-end, houses originally the residences of noble and wealthy families have become clubs or public offices, most of the once stately houses of Great Ormond-street, Bedford-row, and Lincoln's-inn-fields are now occupied by business people, who hold floors or even single rooms, and the smaller houses in less important and adjacent streets are full of lodgers. Within a certain radius of Temple-bar the residential population is almost entirely composed of lodgers; that is, of persons (families or groups) who occupy a portion of a house, a floor, or even a single room. The householders, that is, those who occupy an entire house, have long retreated to Kensington, Bayswater, or Belgravia.

In residential neighbourhoods the fashionable street, at a certain period of its prosperity, is always a prey to a species of attack peculiarly English in origin and character; and this, the beginning of a course of disintegration to which it is always at some time or other subjected, is often singularly fatal. The thin end of the social wedge which ultimately destroys [illegible]

perhaps a physician. He obtains quietly, and after much patience, a house situated at the corner of the subsidiary mews, which is an inevitable adjunct to a fashionable residential street, but he wisely makes no sign by either door-plate or special bell. In the course, perhaps, of years, and we write with caution, he is followed by another, less fastidious and circumspect, who takes an adjoining house; but who, using only the ground-floor rooms and a demonstrative street-door, secretly lets the "upper-part-of-the-house" to a noble bachelor or a South American legation. A general practitioner is sure to follow; and then—so rapid is descent upon the steeps of fashion—some house blooms into a parti-coloured threshold, an olive-green door, and into windows of "lead-lights," announcing the premature arrival of a thriving architect. The advent, at no distant date, of an æsthetic upholsterer—artist *pur et simple*—completes the doom of the street. Thus, one class invades another class, and assaults it in its most susceptible point—its home. An attempt at resistance is sometimes made, but it is slight and of no avail. The wounded householder—whose aspiration it is to live far away from any trace of the means of livelihood—flies to another street further from the heart of town, only, however, to incur, in course of time, the same rude shock, and to continue his flight to the suburbs.

"*La maison, c'est le vêtement de la famille*"; and the retreat of one family is followed by the arrival of another. But this is just what does not occur in central London. The discarded vestment is too rich or too plain to please the new comer; or more often it does not fit the sort of person who steps in to fill the void left by the fugitive. The coat is cut up,—divided like Joseph's garment among several people,—and once in pieces remains an effectual covering to none.* The house, perfect in itself, built for the special accommodation of one family or group, becomes tenanted by several groups, who, if they carried out co-operative housekeeping, might perhaps find an advantage in such a division of tenements. But this they neither attempt nor desire. The tenants try to make the different fragments of a house each a home in itself,—that is, each fragment independent of the other. This social deterioration does not, as a rule, imply depreciation in the value of houses as property. Wherever business is extensively carried on, a house of four stories, all told, which would obtain as a single private residence a rental, say, of 150*l.* per annum, brings in an income of almost double that sum if it be let by floors or rooms. It is, therefore, to a leaseholder's interest to get rid of the family occupying an entire house, because he can let it in fragments at an enormous commercial advantage. These fragments become, at the street level, shops; on the first and sometimes second floors, offices; and on the upper floor, lodgings. Near Charing-cross such residences of three rooms, bare and unfurnished (on the second and third floors), fetch from 50*l.* to 100*l.* per annum. Near Bond-street similar sets of rooms bring in from 80*l.* to 130*l.* per annum. An inquiry into the total amount realised by the numerous speculators who, in the vicinity of the great clubs, let single rooms to bachelors would probably show a profit upon their original outlay for rent and taxes of more than 100 per cent. As far back as 1855, two houses in Blackfriars, which were worth together 44*l.* per annum, returned under the careful direction of the middleman a yearly rental of 180*l.* Ten years ago it was estimated by a competent authority that the miserable tenements in St. Giles's cost the occupants—per 1,000 cubical feet—as much as the owner of the land on which they rested would pay for a luxurious mansion in the most fashionable London square. Since then, house-rent has risen higher; and until such houses fall, at the expiry of their leases, into the ground-landlord's possession, the majority of them will remain as they are, and as they have been, for more than the last quarter of a century. None of the speculators connected therewith would gain anything by attempting to improve or alter them; certainly not the landowner, whose land, while the lease endures, will not increase in value by any building addition or amendment; not the leaseholder, who will have to give up the land, and all that stands upon it, at the termination of his lease; not the nominal householder, who sublets at a large profit, and whose rent would probably be raised if the building were improved. Thus the Englishman's "castle" follows what may be called the natural law of native bricks and mortar. Some, perhaps, may think it a beneficent one; for, as grade after grade of the elevated community disappears, inferior classes come upon the scene, and in their own fashion fill the vacant houses, still at a profit to the owners. It is, however, anything but a beneficent, or even an economical system. It is attended with sanitary and social inconveniences of every description; and the profit already obtained by dividing one house into several extemporised dwellings might under another and more methodical system be double what it is, not only to the owner of the house, but also to the ground-landlord; while the lodgers, at present put to all sorts of shifts, would be enormously benefited.

The decay of a residential neighbourhood is always accompanied by the spread of what is known as a "slum"; and in this particular Central London offers an infinity of choice. In the small hours of the morning the member of Parliament, the club frequenter, the press-man,—from Westminster, Pall-mall, or Fleet-street,—often trudge to the circumference through labyrinths of small narrow houses, some of three stories, others of four, and a few even of two stories only. There seems to be no method in the mad speculation by which alone domestic London is built. In many parts ground is wantonly wasted; yet the lateral extension of the metropolis is so enormous that economists may well inquire if the most be made of the land it covers. That the most is not made of it even in the crowded localities, is certain. There is the example of Paris for comparison and illustration. From time almost immemorial the French capital has been enclosed with some description of wall, and it has, therefore, been partly compelled to increase vertically,—that is, extra stories have been added to the houses. As in Edinburgh, where the peculiarities of site rendered the same expedient necessary, people built over instead of alongside their neighbours. Of course, while the town remained of small circumference, it would have been better to have added new houses rather than to have raised old ones; but when such proportions as those of modern London are attained, it becomes a different thing. It may be argued that an area of twenty square miles covered with houses of three stories such as those in London, or of ten square miles occupied by houses of six stories, such as those in Paris, is nearly identical in the end, because the French houses are constructed upon the horizontal system of plan, and the English ones upon the vertical mode of arrangement; and that although the French or Continental system represents economy of space, it implies a greater chance of polluted air and of overcrowding than the English method. This, however, is not the case, because houses on the French plan must perforce be more strongly built, stand upon more open sites, and in broader streets, than ours. It should be remembered that, less than ten years ago, the rough average of inhabitants per house in London was eight to *thirty-five* in Paris. It is said now to be about six souls per house in the English capital; but statistics of this kind are, we grant, often entirely deceptive. The rate of progression at which the metropolis has increased of late years is, however, perfectly clear. We have but to refer to our own pages to show that in two years alone—1862 to 1864—164 miles of streets and squares were made in London, or, at least, in what a short time ago would have been called the outskirts of the town. Happily this did not continue, or London streets would have been lengthened some 82 miles every year. Not very long ago the average number of houses built annually was about 16,000, and in 1874 nearly 8,000 were built. "The total number of houses built from 1849 to 1874—that is to say, in a quarter of a century—is 270,327, giving an average of 10,813 per annum."* The economical distribution of buildings of all kinds in the heart of the town is, therefore, a point of the utmost importance to freeholder, leaseholder, householder, and to the public generally. Many families, who, years ago, retreated to what were then suburbs, have returned in desperation to the centre; for the green fields and villages, which existed at the period of their flight, are now irrevocably covered and absorbed.

London, neither metropolis nor capital in the ordinary meaning of either term, is become an ever-extending province of buildings; and, in its centre, it has been the invariable rule for many years—for half a century, at least—for the vast majority of the small, ill-built houses, each intended for the accommodation of one family, to be occupied each by two, three, or more groups of people. Yet, in the new houses, building speculators, almost without exception, continue to superpose two or three rooms over two or three rooms, with a kitchen below the ground level, and two servants' bedrooms in the roof. Like the old, the new building is almost invariably arranged for the home of a single family; and it is taken for granted that the several groups who must inevitably inhabit it will share not only the house but the home,—which never by any chance takes place. We are not referring here to those classes of the population in Central London for whose benefit a recent Act of Parliament was passed, and is now in operation. We urge the remodelling of the ordinary house,—of the "speculating builder" class, and of the type usually to be found on the London estates of noblemen,—with a view to accommodating those numerous families and groups who at the present moment are compelled to share indiscriminately a house originally built for the use of a single family; and who, perforce, inhabit "lodgings," which possess all the disadvantages, and none of the advantages, of those private and economical residences abounding in the heart of such capitals as Paris, Vienna, St. Petersburg, Brussels, and Berlin.

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* Any one who takes the trouble to look, even carelessly, through our thirty-three volumes will stumble at short intervals upon letters from correspondents, couched often in similar language, referring to this subject of house accommodation in the centre of London. Fifteen years ago, Mr. F. B. Payton wrote to us an admirable letter. He said:—"There are in London hundreds of streets consisting of houses which were apparently intended when built for the residence of one family of whatsoever station, that are now occupied by many. Houses planned for the accommodation of gentry or of wealthy tradespeople, when, in the course of time, fashions set out for new localities, become, like old clothes, the shabby gentility of gradually lowering grades, until they sink into back slums. . . . . These houses can hardly answer the purpose of any of those succeeding the first-class occupiers; and yet one would think, considering the well-known fact that a large amount of rent is collected from tenants, even of the poorest class, that they were all worthy of consideration, in a commercial, if not a social or humanitarian point of view. In the intermediate steps of their decadence, however, these structures sometimes fall to the lot of a respectable class of tradesmen of small means, or of mechanics, in which tenure they often remain. These holders frequently let out a portion, in some cases nearly all the rooms in pairs, or even singly, reserving to themselves, perhaps, the ground-floor. It would be useful to know how many houses in London entertain lodgers; probably were the figures at hand, they would create great surprise. Yet, with slight exception, there are no houses built to afford accommodation to lodgers. . . . . Many 'happy homes of England' are placed one above another, in a manner which almost belies our reputed love of domestic privacy, when we consider how easily they might be separated."—*Builder*, vol. , p. 148.

Long before this, however, we had ourselves again and again traced the gradual decadence of parts of the town in this way, particularly while continuously examining its "slums" in a manner that up to that time had not been elsewhere attempted.

THE ARCHITECTURE OF THE THAMES BRIDGES.

A MONOGRAPH on the subject of the crossing of the Thames, whether by ferry, by bridge, or by tunnel, would be a very valuable addition to the library of the architect and of the civil engineer. Nor would the interest of such a work be exclusively professional. If the subject were adequately handled, it would have charms for the historical student, for the archæologist, and for the lover of general literature, no less than for the student of the constructive arts. The reader would be bidden to glance back to that period, so early in our own history, and yet so recent in the history of the world, when a ford across the Thames, defended, in some manner which it is now difficult altogether to understand, by stakes, was attacked and carried by Julius Cæsar, on his march towards the British capital at Verulam. It would describe the primitive vessel in which, in pre-Roman times, the Britons navigated their abundant streams,—namely, the coracle, which is to be found at the present day on the Towy and other Welsh rivers in the exact form in which it swam on the Thames in the days of Cæsar. It would tell of the listering of the salmon on the sandy reach of silvery water that washed the island afterwards chosen as the site of the Abbey Church of St. Peter—then Westminster. It would tell how, in that stirring time when Christendom had first awakened to the possibility that the world might last for another thousand years, men began to build bridges, as well as churches, convents, and castles. Domesday Book had just been compiled; Peter the Hermit was stirring Europe by his wild self-imposed mission; the Crusaders were on their way to the Holy Land; the red king was rearing the noble

* See p. 423, *ante*.

roof of Westminster Hall; a season of unusual scarcity was following one of great mortality in England;—when the first stone bridge was erected over the Thames to replace the wooden edifice that had supplanted the ancient ferry. A timid and ponderous structure was that ancient bridge. It is a marvel that the Roman masters of the country had impressed on its inhabitants so little of their own magnificent genius for public works. Down to the memory of those who are not yet very old men, the bridge that, with various changes of fortune, was finally replaced by Rennie's noble work nearly half a century ago, occupied nearly as much waterway by its piers and starlings as it kept open by its small and ill-constructed arches. London Bridge was a combination of street, defence, chapel, drawbridge, and waterworks, and formed at once one of the quaintest relics of the past, and one of the most inconvenient makeshifts of the time when the nineteenth century was young.

A monograph on the bridges of the Thames, if even it did not extend higher than Windsor, would contain descriptions of structures of the most various design, and of the utmost difference in cost. The statement of the actual cost of each bridge or tunnel would be a necessary and most valuable accompaniment of the description of the works in question. Thus Walton Bridge was acquired by the committee formed for promoting the free passage of the Thames, in 1870, for the modest sum of 7,000*l*. It is not, of course, to be assumed that this represents the prime cost of the bridge; but it is the price at which it was sold by the owners, including the right of toll. The Thames Tunnel, on the other hand, cost nearly 455,000*l*.,—a not extravagant outlay for that noble work, considering the great physical difficulties attendant on an attempt to cross the bed of the river at so small a depth below low-water mark. Mr. Barlow's little tunnel, wisely driven through the solid clay, was estimated at the small sum of 12,000*l*.; and there is no doubt that a full-sized tunnel might be carried through the same stratum for a very moderate cost. The difficulty, from a financial point of view, lies not so much in the work itself, as in the approaches. To provide adequate approach to either bridge or tunnel is a task quite as serious as the actual crossing of the river. Thus, out of the sum of 1,050,000*l*., which Waterloo Bridge cost, only 565,000*l*. were spent on the architectural structure. The balance was the cost of land and approaches. London Bridge cost about 22,000*l*. less than Waterloo Bridge. In these two noble works we have examples of approaches of the best practicable character. The idea of spanning Thames-street by a land arch has been one of the main causes of the architectural beauty which Sir John Rennie was able to secure, as well as of the unrivalled convenience afforded for traffic. Owing to the excellence of its approaches, London Bridge attracts and retains a large proportion of traffic which, as mere matter of distance and of plan, might be expected to cross either Southwark or Waterloo Bridge. The requirements of public traffic are illustrated in a remarkable degree, by the proportionate use made of these three bridges, as well as of those of Blackfriars and of Westminster. But of these five important structures, two are comparatively unused. The reason is not far to seek. Southwark Bridge, which, as a matter of position alone, is perhaps only second to London Bridge itself in importance, is comparatively inaccessible, owing to the steep pitch at which it rises from the Surrey side. The hindrance thus caused is so great, and so unavoidable in case of heavily-loaded vehicles, which, in their turn, check the speed of the lighter conveyances, that it proves more convenient to follow a better section, although at the cost of increased distance, and risk of delay from block. In the case of Waterloo Bridge, on the other hand, the half million spent on the approaches has been well laid out. The mechanical arrangement is admirable. But here the economic obstacle comes in, and the toll both on man and beast imposed at Waterloo Bridge has acted quite as prejudicially, as far as the utility of that structure to the public is concerned, as the steep approach to its iron neighbour. The result is most prejudicial to the neighbourhood. Waterloo Bridge, at present, is chiefly used as a kind of back door to the London and South-Western Railway. It is less irksome to passengers, driving from and to the Waterloo Station, to pay their 2d. to the warders of this noble level viaduct, than it is to drive round by Blackfriars or by Westminster. And the course of the goods traffic is to a great extent determined in the same way. For this reason, instead of that thriving, active trade which occupies every window along the great unimpeded thoroughfares, we see the sleepy, timid, questionable sort of business that betakes itself to a suburban home, for the sake of economy in rent, occupying the line of this great national artery. If the property, say, from the Strand to the South-Western Station were all syndicated together, under one intelligent management, we very much question whether it would not pay such a management to purchase the right of toll, and to throw the bridge freely open to the public, for the sake of the rise of rent, and increase of value, that would at once accrue to the house property along the line of route.

So much has already been spent on the metropolitan bridges, that it is inconceivable how the City and the public at large can be contented to rest until the best is made of the existing structures. At certain intervals of time the question of widening London Bridge is brought forward again and again, and discussed with as much acerbity and with as much disregard of common sense as if the leading features of the case had never been distinctly stated. The want of proper approaches to Southwark Bridge has thrown so much traffic on the line of London Bridge that matters would be very little (if at all) mended by doubling the width of the latter. The block would, in that case, take place all the same, though it might be transferred, to some extent, from the immediate vicinity of the bridge to the least convenient parts of the approaches.

Since the beginning of the present century the Corporation of London have spent 1,617,164*l*. out of their Bridge Estates for the maintenance of old London Bridge, the erection and maintenance of new London Bridge, the purchase and maintenance of Southwark Bridge, and the erection and maintenance of Blackfriars Bridge. To this sum must be added an outstanding debt of 615,000*l*. charged upon the Bridge Estates of the Corporation for the same purposes, making a total of 2,332,164*l*., or say two millions and a third sterling. The form of the return made by the Corporation does not allow us to distinguish exactly the cost of the two latter bridges, as one of the sums yet due is said to be in respect of rebuilding Blackfriars Bridge and the purchase of Southwark Bridge. The average annual expenditure in maintenance may be worked out as follows:—London Bridge, for seventy-five years (old and new), has cost 1,345*l*. per annum; the cost down to 1840 having been taken regularly at 1,000*l*. per annum. Blackfriars Bridge, from 1834 to 1868, cost an average of 5,060*l*. per annum in maintenance; the expense of supporting the old bridge having risen to 14,960*l*. in 1863, the year before the first expenditure on the new structure. Since 1866, up to which time Southwark Bridge was maintained by the Southwark Bridge Company, who charged a toll, the Corporation has spent 1,671*l*. per annum in the maintenance of this work. Deducting the cost of maintenance, which amounts to 318,744*l*. from the total outlay of the Corporation on these three bridges, we find that 2,031,420*l*. have been the cost of the erection and purchase of the three bridges, of which sum 1,027,869*l*. are set down to the erection of London Bridge alone.

The distance by water from London Bridge to Windsor is something over thirty-two miles. The number of bridges in this distance is also thirty-two, which is exclusive of the two tunnels below London Bridge. Between 1870 and 1876 the toll-bridges at Kingston, Walton, Staines, and Hampton Court have been purchased, at an aggregate sum of 90,773*l*., and thrown open to the public. The Bill unfortunately lost in this year's Session of Parliament provided for the purchase of nine bridges, and two foot-bridges, at the estimated cost of 1,500,000*l*. This would make a total of 3,604,193*l*. paid by the City of London and the Metropolitan Board of Works (that is to say, by the ratepayers) for the erection or purchase of sixteen bridges. The average cost is thus about 225,000*l*. per bridge; but neither this average nor the statement that the payments ranged from 7,000*l*. for Walton Bridge to nearly one hundred and fifty times as much for each of the great well-approached metropolitan bridges, is so satisfactory as would be that comparative statement of the design and cost of each of those structures, which we have indicated as a professional desideratum.

The railway bridges that cross the Thames in the district in question, and which we included in the numbers given, are eleven in number. They vary in design, in cost, and in architectural, if not in engineering merit, to almost as wide a range as do the roadway bridges. With regard to the important question of the gradient of the approach, and of the provision of approaches exactly consistent with the capabilities of the bridges themselves, the railway bridges are, of course, much nearer to theoretical perfection than are the roadway bridges. On the other hand, in the matter of engineering economy, or the outlay of so much money, and no more, as would meet the engineering requirements of the case, the railway bridges will probably be pronounced far inferior to the road bridges; not forgetting that with regard to one of the latter, in which iron is the main structural material, the *ne plus ultra* of repulsive ugliness has been attained. In some of the larger and more pretentious structures, on the contrary, there is something worse than the bald ugliness of naked inelegant structure. There is the attempt to give architectural decoration, without the presence of architectural taste. Proud as we may rightly feel of those massive structures, as permanent as any iron structures can be made, that allow the free passage of hundreds of laden trains to and fro over the surfaces of the Thames, as matters of engineering, we have but too much reason to be ashamed of them as matters of architecture. In fact, we want some other word to denote their elaborate hideousness. Every builder seems to have done that which was right in his own eyes, and rather to have chuckled to himself at the odious eyesore that he was about to inflict on his neighbours, than to have endeavoured to immortalise his own name as that of one who knew how to cast some seed of beauty in things useful. The opening of the Northumberland Avenue has given us a very costly lesson on this point. To any one who advances from Cockspur-street or from Pall-mall East towards the vacant site long occupied by Northumberland House, the prospect is something altogether humiliating. Absolute despair can only be avoided by the hope that some sort of buildings will hereafter be raised to such a height as to conceal that which is now the dominant feature of the landscape,—the huge, hideous wagon-headed roof of the Charing-cross station. But until, by some means or other, that unpictorial abomination is veiled from view, it is idle to talk of architectural effect. The view, at present, is simply detestable as a *coup d'œil*, and no amount of grace or beauty in minor details can in any way redeem it, so long as that vast boiler-like roof towers over all.

It is pretty clear that such a work as we now suggest will be more satisfactory as to its engineering than as to its architectural details. But it is a great mistake to endeavour to separate the two. In the hands of a true architect,—a master of the structural art,—plain structural lines may become so graceful as to gratify the eye when unadorned, and to lend themselves to the most charming decoration. All that is most beautiful in Gothic architecture has thus originated. The flying buttress and the towering pinnacle are cases in point,—the glorification, rather than the concealment, of the plain strut. In bridge architecture the most important advance which has been made is in the method of sinking foundations. In old bridges yet standing in many parts of the country, the builders merely cleared the ground to the lowest level that the water left uncovered when at its lowest ebb, and built their piers and abutments on that surface. Massive bulk, in comparison to the span of the arch, was thus necessary to the solidity of the pier; and this cumbrous proportion characterises most of the bridges to which we refer. With the advance made by Smeaton, Telford, Rennie, and the men of their school, the foundations were more accurately regarded. The invention of the cofferdam allowed the excavation of the bases of the piers down to an absolutely reliable foundation. It thus became safe to throw more weight on the superficial area of the piers; and the spans of the arches were widened in consequence. The waterway was opened for perhaps four-fifths of its entire width, instead of being restricted to little more than half the channel. Where rock foundation occurred, the builder was yet bolder; spanning the river in a single arch, as at Chester, or hanging a platform from chains stretched between lofty towers, as at the Menai Straits. During this period of scientific and practical advance, London Bridge, Southwark Bridge, and Waterloo Bridge were erected. The architectural difficulty with which the bridge-builder has now mainly to strive is the substitution of some perfectly satisfactory

feature for the old starlings. Piles were driven into the bed of the river to protect the natural foundations of the piers to which we formerly referred. As these were multiplied and tied together, from time to time, adapted in some instances for landing-stages, but always bearing that stamp of real utility of purpose which cannot fail to give a picturesque force to any architectural elevation, they became recognised as a permanent element of the river-bridge. When foundations were more scientifically laid, the starling was replaced by a stone projecting platform, advancing to some distance beyond the line of the parapets of the bridge, and pointed to cut the current of the river, or the flow of the ascending tide. In many instances these stone starlings are real and useful additions to the solidity of the pier. But the question of the pictorial beauty of the structure hinges for the most part on the treatment of the spandrel, or blank triangular space between the *extrados* of the arches, and above the level of the starlings. If this is left blank, it gives a heavy clumsiness to the elevation. And yet any attempt to veil or to decorate this space by projecting columns, or other non-structural devices, is usually so plainly useless, so evidently a cost which is not of the need of the bridge, but incurred for a pictorial effect which is rarely good, that bridges are, in nine cases out of ten, failures as attempts at graceful elevations.

A collection such as we have suggested of the various elevations of the Thames bridges would render to the architect the great service of enabling him to compare the mode in which this difficulty has been met by the builders of our bridges. Closely connected with this part of the subject is the question of rise of roadway. In a railway bridge a level platform is needed; and if the exigencies of construction raise the parapet over the waterway openings so as to form aërial arches, still the horizontal line can never cease to form a true structural feature. It is by the use of iron that this mode of construction, which resembles in some degree an inverted suspension bridge, can best be carried out. But in road bridges it is matter for consideration, according to the special details of each case, whether the level line should be adopted. There are good reasons against it in many cases. A greater height may be desirable in the centre of the waterway than near the shore. If the levels be such as to require an ascent from each side of the bridge, the cost of the approaches will be reduced by continuing the ascent until it meets the descending gradient, that is to say, by giving a moderate curve to the roadway over the bridge, in vertical section. The main engineering objection to this plan is the fact that it is desirable to make the transit over the actual platform of the bridge as easy as possible, so as to avoid any risk of stoppage on the structure itself tending to an arrest of the traffic in the most critical point. Between these two requirements the architect has to exercise his judgment, and the usual result has been the adoption of a cambered line of parapet. A comparison of the elevations of the various bridges will throw light on the pictorial results of the various modes adopted for dealing with the blank spaces between the arches, and for determining the level or curved line of roadway and parapet.

Again, the question of original cost, as compared with the cost of maintenance of a bridge, is one on which it is desirable to throw into accessible form the experience attained from the Thames Bridges. We have seen that the repairs and maintenance of old London Bridge were kept down to the rate of 1,000*l.* per annum, to the year 1834. Since that time the annual charge has increased to an average of one-third more; but this includes sums of 3,000*l.* and 4,000*l.* spent in alterations or renewals in 1842, 1851, 1859, 1865, and 1869. The enormous traffic over this bridge wears the roadway with irresistible force. Blackfriars Bridge steadily increased in cost of maintenance from 1834, when it cost 1,220*l.*, to 1863, when it cost 14,960*l.* The maintenance of Southwark Bridge, if the matter be under proper supervision, may be taken to show that an economy made in the first instance by introducing comparatively steep gradients, is counterbalanced by the wear and tear occasioned by the resistance offered by such gradients to the horses. For Southwark Bridge, with its comparatively small traffic, and with no expenditure likely to be incurred below the springing of the arches, and but little, except painting, below the roadway, to cost 1,671*l.* per annum, against the cost of 1,345*l.* per annum on London Bridge, is not what might have been anticipated. The comparison of the prime cost and annual maintenance of Westminster Bridge, in which lightness of structure has been carried, at all events, as far as can be thought in any way desirable, would shed additional light on this important practical question.

We may mention that when, in the year 1755, it was proposed to build a "new bridge over the Thames at Blackfriars," the cost was estimated at 110,000*l.*, which it was proposed to raise by way of tontine. In regarding the provision which will sooner or later become imperative for a crossing of the river below London Bridge, we must calculate on an expenditure of at least a million sterling. We have little doubt that by sinking to the solid clay a tunnel might be completed beneath the river for a considerably less cost than the 455,000*l.* of the original Thames Tunnel. But with every foot of rise or fall above the ordinary level of the shore the cost of approaches increases. It is open to doubt whether 545,000*l.*, being the balance out of a million, would be adequate to provide the best possible approaches to a tunnel at the low depth required by the engineer for safety, at least without enormous cost. On this important question, however, it is desirable to bring together all the information that exists. The land required for the approaches to London Bridge was of higher value than any property lower down would have been at the time of the purchase. But we are aware of the steady rise of prices in all directions. No engineer could now hope to build a new London Bridge for less than the sum expended by Rennie. He might save in the foundations, but the labour would be more costly, and the land far more costly. What is requisite is a compendium of actual experience on the subject, and we shall be happy if we have in any way advanced the prosecution of so valuable a study.

BELLINI AND CATANIA.

WE were invited to "assist" at a very interesting ceremony on the 16th inst., at Père la Chaise, in Paris,—the exhumation of Bellini's remains. Nothing was omitted in the arrangements which could do honour to his name or the countries represented. Arrived at the cemetery, we saw a sail-cloth on the ground, an open oak coffin in the centre, many members of different *corps diplomatiques*, soldiers, gardes, and Italian marines around; then came a procession of the noblemen of the Sicilian Commission following the coffin just disinterred. It was placed alongside the other, opened, identification made, and then lifted into the oak coffin, which was placed within one of crimson velvet with silver ornaments; wreaths of oak and laurel, tied with Italian and French colours, were placed on it by the Italian Minister's representative, and then the Marquis San Giuliano stepped forward, and made the following address, which was most impressive, as he has a clear voice, besides many other qualifications requisite in oratory, and is well known in Catania as highly educated and somewhat in advance of the age. All listened with attention flattering to him as well as his subject. He said:—

"I am not going to speak to you of Bellini; one does not praise *genius*,—above all, such a genius as Bellini was, who possessed in the highest degree the marvellous power of profoundly touching the souls of men. One need not show you that he was grand and sublime in his pure simplicity, because one only requires a heart to understand him, and to foresee that his works will not perish whilst gentle and refined feelings exist. I speak only to testify to Paris—to France—the lively gratitude of my compatriots. We shall never forget the enthusiastic reception Paris gave Bellini in 1835; we shall never forget that in the deafening and unanimous cheers which then resounded through the Salle des Italiens the name of his country was united with his own; we shall never forget that, when an untimely death snatched him away from art, from Italy, and, allow me to add, from France, the grief was as general and sincere here as in his native town, of which he was the idol and pride, and where he lived amidst his family and friends. We shall never forget the fresh mark of esteem which France gives at this moment to him and to his country by your presence here. My colleagues and I only represent here the town of Catania; but I can confidently assert that the feelings which I have just expressed are shared by all Italians, and that the echo of this ceremony will resound from one end of the country to the other, and will trengthen anew the bonds of sympathy and friendship which unite Italy and France."

This was followed by some orations in Italian by President Prince Grimaldi, the composer, Ardizzoni, and the dear friend of Bellini, Commandeur Florimo, of whom in his last delirium he spoke, unconscious of his presence, and thinking his mother watched him, "Call Florimo, I cannot die till I have seen him." To hear him speak, therefore, of the merits of the illustrious dead severely tried the emotions; broken words and sobs had their own eloquence, and called forth deep feeling in many. A funeral car, in black and silver, waited to convey the remains to the Lyons Railway Station. The wreaths were hung over the plumes of feathers at each corner, the Italian Minister sending one, which was placed over the door, of great size and beauty. Then the *cortége* moved slowly; the funeral car, eighteen mourning coaches (black and silver), containing the noblemen charged with the commission from Catania, some private carriages with their relations and friends, the calm, if curious, Parisian mob; and the ceremony was brought to a close after two hours by the deposition of the coffin at the station, whence it would be taken to the Straits of Messina, to be put on board a frigate and received in Catania with every possible honour.

PROPOSED MONSTER BALLOON FOR THE PARIS EXHIBITION.

AMONGST the propositions on which it is said the Commissioners have looked favourably, is that of M. Henry Giffard, an engineer of reputation, who has projected a huge captive balloon for 1878. It would be formed of silk and sheets of India-rubber, covered with varnish, and painted white to reflect the rays of the sun. The balloon would be about 110 ft. in diameter; the car itself would form a gallery nearly 50 ft. in circumference, and the balloon would be held to the earth by eight cables attached to iron rings secured in a wall of masonry, and it would take up forty or fifty persons each time. The cable by which it would be brought down is described as working round an iron axle more than 6 ft. in diameter, and 23 ft. long, worked by a steam-engine of 200-horse power. The length of the cable would be about 1,800 ft., and the balloon would ascend about 1,600 ft. from the earth. The quantity of iron filings and sulphuric acid needed to produce the gas required to fill the balloon is something enormous, and the process would have to be repeated about every forty-eight hours. To us, the game seems hardly worth the candle,—at any rate, such a very big candle. It is like Mr. Gamgee's very ingenious "Glaciarium," where two steam-engines are kept going to enable a dozen persons to do a little skating out of season!

THE EXHIBITION FOR SOUTH AFRICA.

THE South African International and Intercolonial Exhibition, to which we have already drawn attention, will be opened at Cape Town on February 15th, 1877. The building will be in the gardens of the Masonic Lodge of the Goede Hoop, adjoining the House of Assembly. The Exhibition is to tap, in addition to the Cape Colony, the neighbouring territories of Griqualand West, Natal, the Orange Free State, and of other promising communities. Goods intended for the Exhibition should be shipped from London not later than the first week of December, 1876. Mr. Edmund Johnson is the Commissaire Délégué of the Exhibition in Europe, and the central European offices are at 3, Castle-street, Holborn, London. The Exhibition is also to have its representatives at Paris, Berlin, Vienna, Turin, and Amsterdam. The building is being prepared in this country, of glass and iron, somewhat in the style of the 1851 Exhibition. With the materials will go out workmen to put them together. The demand for labour in the colony for railways and agriculture leaves few hands to spare either for manufacture or construction. The Exhibition will be open during the Cape summer, which begins in November and lasts until April.

University College.—The engineering and architectural classes will be opened on the 3rd of October. Professor Hayter Lewis having received leave of absence, the architectural classes will be conducted for the session by Mr. T. Roger Smith.

THE RUSSIAN BUILDING TRADES.

It is absolutely essential to the progress of national industries that their condition at all times, and especially contemporaneously, should be well known. In these civilised days people have learned to depend much more upon recognised authorities for their improvement and benefit than at any other period of the world's history, and a "paternal government" has been the arcanum of national prosperity that has been through all ages searched for in vain. Few people have been enabled to cry, "Eureka!" after their long and laborious search, and we are sure, from what we have seen of the Muscovite, that he cannot consider himself any more successful than the races by whom he is surrounded. His government is too much wrapped up in its ambitious foreign policy of extension. The bureaucratic leaders here seem to pride themselves exclusively upon the foreign secrets with which an expensive espionage has filled their pigeon-holes, and every military man we have met seems more delighted with his topographical knowledge of the smallest village in England, than with his little acquaintance with the condition of the wheat crops of the Crimea. So it is with every branch of Russian trade and industry. We will not vaguely say that there is an unfortunate lack of industrial knowledge in Russia, but we can more circumstantially state that the statistics, without a knowledge of which no one can even attempt to improve the *status quo* of native commerce, are seldom made public, or even collected. The blame for this falls entirely upon the Government, and, to some extent, it is inexplicable. It might be understood very well if Russia were still under the sway of the ambitious Nicholas, but when we consider that the present Emperor has attempted to follow that Augustus whom Napoleon III. took for his prototype, we are at a loss to account for his phlegmatic negligence as to the mainstay of his empire. A few books upon Russian industries have been published at long intervals, under the auspices of some such well-known names as Tegoborski and Schnitzler, but these, through other revolutions which are continually being effected, have long ceased to have any value apart from mere historical landmarks. Once only, in 1869, the Government made a groping effort in its lethargy, and issued a Year-book, but this fitful exertion was doomed never to be repeated. In describing the building trades, however, we have been fortunate enough to find amongst the mass of private publications with which we were favoured during the existence of the recent Moscow Exhibition enough facts and statistics to give a very fair idea of the present condition of these trades; but, besides this, the kindness of local merchants has enabled us to give domestic particulars down to a much more recent date. We shall include under this title stone-quarrying, lime-burning, cement manufacture, gypsum, tile and brick burning, stone-polishing, sculpture (as distinct from statuary), and the manufacture of mosaic pictures. Beyond the privately collected facts we have been enabled to accumulate, there are few data in existence which can be made use of. This little is comprehended in the following statistical excerpt, from the above-mentioned Year-book of the Ministry of Finance (1869). In 1866 Russia possessed eight alabaster manufactories, 146 lime-kilns, 3 cement manufactories, and 2,127 brick-kilns, the total value of their annual produce being a little under four million roubles.

The quarry-stone used for flagstones and ordinary paving is, as is very well known, found in large quantities in the Grand Duchy of Finland. St. Petersburg has to be thankful to these resources for all the handsome building materials which have, in recent years, so contributed to the beauty of the town, and especially the fine granite pillars which ornament the incomparable Neva quays. The most important Russian stone-quarries exist in the governments (*i.e.*, provinces) of Moscow, Wologda, and Tchernigov, the products being used principally for architectural work. In the extensive marble quarry of Mr. M. J. Filatjev, in the village of Pajanka, near the town of Podolsk (gov. Moscow), marble manufactures of yellow-grained marble are annually produced to the value of 30,000 roubles. These manufactures are of the character of table-tops, steps, &c. In order to give some complete idea of how this business is carried on, it may be necessary to mention that in Filatjev's quarry seventy-five skilled or regular workmen are employed, as well as an average of fifty day labourers. Mill-stones are principally made in the quarries of Messrs. P. & J. Gubonin, near the village of Kotelinki (gov. Moscow), and of Messrs. A. & M. Miklaschevski, of Gluchov (gov. Tchernigov), and stone suitable for cutting and polishing for ultimate ornamental uses is found in considerable quantities in the quarries rented by the firm of Messrs. M. & J. Latkin, of Ust-Ssysolsk (gov. Wologda). Here 57,000 roubles worth of these species of stone is annually produced. We have occasionally seen some very beautiful floor paving, and step stone, which comes from the neighbourhood of Reval. The quarries, however, do not at all seem to have been explored as energetically as they deserve. And this is all the more regrettable because the workers have not any of the excuses which hamper many other quarry proprietors. Especially may we mention that there is excellent canal service and many other means of communication between this district and St. Petersburg. As we have before mentioned, the Russian capital consumes large quantities of the very species of stone in which Reval appears to be particularly rich. These quarries are, we believe, at the present moment to be let. Marble quarries exist also in no despicable quantities in Poland, but they also are either not being worked, or are very lazily explored. A species of stone at the present moment very fashionable here for foundation stones, private pavements, and staircases, is the blueish limestone for which the banks of the Ishora are famous. Here, also, are the limestone pits in which most of the lime used for building purposes in the large towns is burnt. Although the lime is generally brought to St. Petersburg slaked, there are also a few lime manufacturers here. The most important of these is perhaps Messrs. W. & J. Strubinski, who produce annually about 1,000 cubic sashes of burnt and slaked lime, at about 33 rbs. per sashe. Another large factory belongs to a Mr. J. Pal. It is established in the village of Soboro, in Peterhof (gov. St. Petersburg). Being in connexion with a cement manufactory belonging to the same gentleman, it is of more than ordinary importance, the amount of its annual produce in burnt and unburnt lime being about 240,000 pouds, varying in price between 15 and 27 kops. per poud. In the same district, on the Krassnaja-Myza estate, is the celebrated lime factory of Messrs. D. & P. Skvorzov, who employ 80 workmen to turn out annually 350,000 pouds of lime, worth approximately 75,000 rbs. The Peterhof district and the neighbourhood of Robscha are especially well endowed with limestone resources. There can be little doubt that the lime manufacture in Russia is at a lamentably low ebb. In the hands of energetic merchants, with, we will not say a large, but an easily available, capital, not only large fortunes could be made out of it, but great benefits could be rendered to the empire by its proper and systematic manipulation.

The small limestone which is useless for burning purposes is very profitably used in the manufacture of cement. This industy has in recent times made great progress here, and there are a large number of firms which, although recently established, are making money as quickly as they can wish. Large, however, as their produce is, it is not at all enough to cover the ever-increasing demand, and so, large quantities of German and English cement are always being imported. The only official record we could find anent this industry (the Year-book of the Ministry of Finance, 1869) mentions that in 1866 there were three cement manufacturers in Russia, employing collectively 260 workmen, who produced 121,200 rbs. worth of cement annually. In juxtaposition to these meagre statistics let us place those which were developed by the Exhibition at Moscow. There alone, nine cement manufacturers exhibited specimens of their goods. Altogether they were then producing 1,500,000 pouds of cement, worth about 381,000 rbs., annually, and for this they were employing 722 workmen. This, even if we do not take into consideration the manufacturers who did not exhibit, is no mean improvement for six years. The cements made in Riga are usually considered the best in the Russian market. Messrs. K. & K. Schmidt, of Podera—a very well-known Riga firm—sell the Roman and Portland cements, which they manufacture at 25 kops. per poud of the former and 35 kops., for the latter. This firm produces about 75,000 pouds per annum, and in addition to forty-seven workmen they employ machinery of 40-horse-power. Another species of cement very much in use here is the peculiar manufacture of a Mr. Raschè, of the gov. St. Petersburg. Of this cement, which is called after the name of the manufacturer, 75,000 barrels, worth 150,000 rbs., are annually manufactured with the aid of 200 workmen and 30-horse-power machinery. Altogether the Russian cement manufacture has been progressing very satisfactorily, and it has every prospect of becoming a very important, as it is at present a very profitable branch of native industry. It is a significant fact that the export of Russian cement is not entirely unknown, for in 1868, 187,754 pouds, worth 35 kops. per poud, passed the European frontiers into foreign countries. This, of course, becomes ridiculous when compared to the import, which in 1868 reached 1,217,271 pouds., but it is nevertheless very satisfactory to see that the beginning is made where so excellent a prospect is in view. The cement industry must become important, even if it confines itself to native supply.

A similar industry of no small consequence is the manufacture of gypsum, here called alabaster. There are several large factories in St. Petersburg, where it is burnt out of the natural gypseous stone. At Dünhof, on the Düna, near Riga, there are large deposits of this stone; and from the quarries of Messrs. C. F. Gerike & Co., of this locality, between 600,000 and 650,000 pouds of gypseous stone are annually turned out. In the neighbourhood of Peypussees the stone is also found, but only in very thin strata, and of by no means good quality. The principal manufacturers of gypsum are established in St. Petersburg. The most important is Messrs Gerike & Co., who, as we have before observed, possess their own quarries at Dünhof. The factory was established in 1847; it contains fourteen large kilns, especially constructed by the firm, and produces annually 250,000 pouds of gypsum, which is sold at prices varying between 15 and 27 kops per poud. Messrs. Gerike & Co. employ thirty workmen and a steam engine of thirty-five horse power. After theirs in importance we may quote the factory of Mr. Julius Balzer, in which 35,000 rbs. worth of gypsum is manufactured every year. Besides these there are many manufacturers, but of them we know nothing except that in everything they are subordinate to the two we have mentioned. There are also several in the interior of the empire, but of these little is known. The manufacturers of alabaster figures and ornaments burn and paint their gypsum themselves. The latter they generally do very artistically. By far the largest quantity of all the gypsum produced is used for stucco-work in buildings.

We now come to a building-trade which is unfortunately not so important in Russia as it ought to be, comparatively with the vastness of the empire: this is the brick and tile manufacture. The large wholesale brick-kilns are concentrated principally in the neighbourhood of all such large towns as St. Petersburg and Moscow, in which brick buildings preponderate, and are on the increase. In the country and the smaller towns wooden buildings are still in a large majority, notwithstanding their combustibility. It is not to be wondered at that they are preferred to buildings of brick or stone; for, since the emancipation, many a quondam serf has been obliged to build his own house, and to him money has been an object of great consideration. That the necessity should exist for the erection of wooden buildings is very much to be regretted, as, in consequence, probably more numerous and serious conflagrations occur in Russia than in any other country. Often a stray spark from the rude firing-means of the humble peasant will develop into a raging fire which will carry off whole villages, and efface every vestige of civilisation from an entire district. Tile manufactories exist in Russia in a comparatively small number, as in the towns the houses are usually roofed with iron, and in the country with wood, if not with humbler materials. Almost the only districts in which tiles are manufactured and used are some of the Baltic and Silesian provinces. In all the large towns of Russia—as if in irony of the ill-luck of the villages—a preponderance of fire-proof bricks is used. Of these there are numerous manufacturers, the best known of which are probably Messrs. K. A. Ljaschkov, of Schitomer, E. A. Jansen, of Petersburg, and Efimov & Ssoboljev, of Slavjanko, on the Neva. Ordinary wall-bricks are made in the largest quantities by Mr. S. Rosterjajev (gov. St. Petersburg), and Messrs. Plater, Starschinski & Schutschuk (gov. Warsaw). The former produces annually about 8,000,000 bricks, worth about 90,000 roubles, employing

or this manufacture twelve kilns, fifteen machines worked by horses, and 500 workmen. The latter manufacture bricks to the value of 80,000 roubles, but almost entirely by steam power. They use only one kiln; that is to say, the kiln of Hoffman's system. We make especial mention of this factory, because we do not believe there are many Russian firms in any branch of industry sufficiently enterprising to introduce new and economising—albeit expensive in cost—apparatus. Hoffmann's apparatus costs about 15,000 roubles; but, as an economiser of fuel, it would be invaluable in the south of Russia, where fuel (especially wood) is by no means plentiful. The most important manufacturers of clay piping, coupling-boxes, mould-bricks, &c., are Messrs. J. Schabaschjev, of Tver.

With respect to the more artistic departments of the building trades, their condition in Russia is somewhat more satisfactory than that of the departments already described. This is perfectly in keeping with the character of the urban Russian. Many superficial observers might imagine, from the habits and manners of the inhabitants of the old and new metropolis, that they were fair criterions of national taste, and *ergo*, they would judge Muscovite civilisation very favourably. Much as we are inclined to acquiesce in this conclusion, we must protest against the reliability of its premises. Civilisation need not necessarily be built on a foundation of faultless æsthetics, whilst it must at any rate have a strong basis of practical science. Russian taste is not the pure development of long ages of artistic teaching, but it really is nothing more than an exaggeration of that sentiment which makes the eyes of the naked blackamoor twinkle when he sees parti-coloured vestments and brightly painted beads. The *civilised* Russians of the present day look upon the artistic in ornament more as an adjunct of the luxury they love so well, than in any way as an embodiment of that absorbing ideal which is so much to the enthusiastic artist. And consequently, their realisations are as false as their perceptions are incorrect. Much as Russian taste is now being purified by the teachings of foreign masters, and the imbibing of foreign theories, there is still a great *penchant* for everything tawdry and overloaded with ornament, whilst the beauty of strict simplicity seems far from being properly appreciated. This may be seen everywhere in Russian public and domestic life,—from architecture and furniture down to the most minute chimney-piece ornament. With this predilection for ornament, it is not surprising that State aid should be given to the development of art studies, and that the industries we are about to discuss should be in a satisfactory condition. But this State aid is founded upon no purely artistic or economical ideas. It is fostered—we will not say to the detriment—but to the neglect of more necessary and practical sciences, in the same way as in Russian politics a great deal of domestic legislation is shelved for the benefit of foreign diplomacy.

The exhibits at Moscow of the results of stone-cutting and polishing were very fair examples of the stage which these arts have reached in Russia. They were almost all, speaking in a strictly industrial sense—of great beauty and elaborate workmanship. In fact, everywhere could be seen, in contradistinction to other industries, how influential the state factories at Ekaterinburg and the Imperial Kolivan factory in the gov. Tomsk were in promoting the welfare and extension of these artistic industries. Prices, as may be imagined, were, and still are, very high. A large oval dish, of wonderful beauty and faultless cut, made out of the rare orlet—a mineral which has recently been found in comparatively large quantities, but which seldom appears in large blocks—was marked 37,873 rbs. The exhibits of the Ekaterinburg Institute were all of faultless workmanship and magnificent material, the vases of agate, rhodonite, nephrite, jasper, and orlet, varying in price between 200 rbs. and 5,400 rbs. Not only these vases, but the smaller and cheaper goods, such as ash-trays, letter-weights, and desk furniture of the same materials, as well as of red porphyry and aventurine, were all finished with the same excellent care in detail. Their high prices, however, render them inaccessible except to the rich. The Ekaterinburg Stone Cutting and Polishing Works were established in 1765, and they now employ fifty workmen. The publications of the executive of this factory estimate the value of the annual production at 23,000 rbs., an amount which is out of all proportion to the prices we have just quoted, even if we assume that a year is required for the manufacture of each large vase. The same may be said of the Kolivan Factory. It was established in 1787; it now employs fifty workmen, and its annual turnover is estimated at 15,000 rbs. We cannot explain these statistics at all. It is probable that the work may take longer than we imagined, because we know that the profits charged are enormous, having no perceptible connexion whatever with the intrinsic value of material or workmanship. The exhibits of the Kolivan Institute at the Moscow Exhibition were very fine. A set of vases of greyish violet porphyry (794 rbs. each) were as much distinguished by the excellence of the material and the beauty of the workmanship as by the simplicity and symmetry of the designs. Another exhibit—a large chimney-piece of sea-green jasper (10,759 rbs.)—was really a wonderful *chef d'œuvre* of the art of stone-cutting. The impulse which State interference has given to the stone-cutting and polishing industries in Russia has resulted in a somewhat numerous and prosperous class of private manufacturers. This is especially the case in Ekaterinburg, and other districts of the Ural countries, and Siberia. In more recent times it has extended as far as St. Petersburg, and we have now here several malachite and lapis-lazuli polishing works of great importance. About the most important private provincial manufacturer is Stebakov, of Ekaterinburg. He has employed the stone-polishing processes for the production of small busts, and the four that he exhibited at Moscow,—of the Emperor, the Empress, the Monk Vladimir, and Jermak, the conqueror of Siberia,—were very successful specimens. The prices were between 400 and 1000 roubles. His letter-weights and fruits, cut out of the stones suitable in colour for their natural representation, and mounted on blocks of jasper and porphyry, are far superior to those of the Imperial factories; and his seals of smoky topaz, mountain crystal, orlet, and other minerals, are of exquisite material and finish. Stebakov's factory was established in 1845; it employs between twenty and twenty-five workmen, and its annual produce averages a value of 30,000 roubles. The manufacture of malachite and lapis-lazulite goods is carried on in a more wholesale manner in St. Petersburg. In fact, there are two firms established here, — Messrs. J. Spöhrhase & Co. & K. Hössreich & Co.,—which are well known all over the world. Before we proceed to describe the works of these two manufacturers, be it observed that only small malachite work, such as earrings, brooches, studs, &c., is cut out of the solid material. Even if, as is sometimes the case, malachite blocks of large size are found, they are never so solid throughout that vases can be wholly cut out of them. Besides this, it would never, under any circumstances, pay, for it would require a superhuman mineralogical knowledge and manual dexterity to evade the rich complications of flaws and cross-grains which characterise malachite *en bloc*. It is, therefore, almost invariably used in small pieces,—for small work in the solid, for large as a kind of veneer-mosaic. For the latter the malachite is cut into layers, of thicknesses varying according to the capacities of the blocks. These are placed upon the object they are intended to ornament, and then cemented with malachite powder or green-coloured mastich. The most difficult work consists in adapting the malachite veneer to bent ornaments. That department of work in which the most artistic care is exercised is the selection of suitable layers, so that when placed together they will have the appearance of one undivided block, with a richly-continuous and apparently natural grain. The process of fitting small pieces of malachite in this manner is not only one of great difficulty, but it requires extraordinary accuracy and experience. Spöhrhase, whose manufactures have a European reputation, only produces such large-sized goods as tables, vases, clocks, gaseliers, and chandeliers. Besides this he does a large trade in lapis-lazuli and also *articles de luxe* of small bulk. Amongst his exhibits at the Moscow Exhibition was a block of malachite weighing 47½ pouds, and which, notwithstanding its size, was worthless except for veneer and small work. Spöhrhase employs thirty-five workmen, and turns out annually 75,000 rbs. worth of goods, which are sent all over Europe and America. Hössreich has a similar business, but it partakes more of the character of a manufactory of ornaments than of necessaries for the building trades. The art of veneering any rounded substance is understood in Hössreich's establishment to an exquisite extent. His *personnel* consists of forty workmen, producing 40,000 rbs. worth of stone ornaments per annum. Besides these houses, there are many working jewellers in St. Petersburg who work up a great deal of malachite into *bijouterie*. In the manufacture of all large malachite goods the Russian industries are far superior to the foreign, but the latter excel in both the excellence and the lowness of price of their malachite small ware. The reason of this is that the Russian workman, although most versatile, does not excel in skill, and if he does turn out anything fine a price is asked for it out of all proportion to its intrinsic value. Considering that malachite workers all over Europe procure their raw material much oftener from Russia than Australia, it is presumable that with the spread of technical education the Russians will find it easy to keep the entire trade in their hands. Spöhrhase, as we have before observed, exports in large quantities, and that is principally because he has a reputation not at all controlled by prices. He uses, like all the better-class of stone-cutters and polishers, Demidoff malachite, which here in St. Petersburg costs, warehoused, between 120 and 180 rbs. per poud. It is a pity that working in malachite is not more developed in England. It would do a great deal of good. In buying from Russia you have to pay preposterous prices, whilst you have artisans much cleverer than it has ever been our lot to observe here, and you can import malachite from Russia at reasonable prices. It is not likely that the malachite industries will ever become great sources of national prosperity; but, as we have said before, some discretion in price might so act that Russia would enjoy a monopoly of the trade for many years to come.

We cannot dismiss this subject altogether without saying something of sculpture. We are unfortunately unable to say anything on this subject except from what was seen at the Moscow Exhibition. The materials which are principally used are marble and granite, the former, in a great measure, for chimney-pieces, washhand-stands, pedestals, and gravestones; and the latter for gravestones, steps, and balusters. At the Exhibition the principal style of sculpture was in the shape of chimney-pieces. Some were very beautiful. One, in particular, in black Belgian marble, after a design of the architect Schreiber, was exhibited by Messrs. Botta, Bros., of St. Petersburg. A rich choice of goods was found amongst the exhibits of Messrs. Maderin & Rudgis, of St. Petersburg. Two chimney-pieces in white, and one in black, marble, ornamented in the style of Louis XVI., attracted much attention. Their prices varied between 350 and 1,400 roubles. The workshops of this firm, established in 1810, employ sixty workmen, and produce 50,000 rbs. worth of goods annually. Grave monuments are sculptured principally in the workshops of Ehrenberg, of St. Petersburg. He employs sixty workmen, but only turns over 25,000 rbs. every year. Russian sculpture is rapidly becoming an important industry; but it is to be hoped that however industrial it may become, it will largely use the aids of artistic studies. Another branch of the building trades which has the advantage of State aid is the manufacture of mosaic pictures. This industry is in Russia more important than in any other country of Europe, because mosaic work is still very much used for the ornamentation of Russian churches, and especially for altar pictures; whilst in other countries the use of mosaics for churches is a thing of the past. The Imperial Academy of Arts at St. Petersburg owns a small factory itself, which is occupied in the production of all those differently shaped and coloured stones and glasses of which mosaic pictures are formed. The productions of this institution, which was established in 1851, are very fine. Altogether, the Russian building trade is in its infancy, and, like everything else of an immature age, it is liable to drawbacks, weaknesses, and errors. It will not be long before the Russian systems will be altogether revolutionised; and then, when Government and people walk hand in hand, with no ulterior object in view than the practical good of the country, all those industries which are founded upon its natural resources will rise and flourish.

St. Petersburg.

Salisbury Cathedral.—It has been decided to re-open the choir of this cathedral on Wednesday, the 1st of November (All Saints' Day), the work of restoration and refitting being in course of completion.

HOW THE MOSQUE GREW.

Now that "Eastern,"—to use that most comprehensive word,—matters are so much and painfully, in more senses than one, in the world's eye, it may be opportune to glance at one or two things which the Oriental man has done and is yet doing *well*. So much has been said in all sorts of ways about the East, from the earliest of recorded times, down to the modern "Tancred," that there would hardly seem to be anything more left to say. But, truth to tell, there is very much to be said and to be yet thought over before the subject is rightly understood, to say nothing of exhausted. Indeed, the difficulty is not to know when to stop, but where best to begin, so really *new* is the subject, if there be anything true at all in the most recent utterances of those best qualified to judge of it, after years of personal looking at and experience. We know of but few things indeed stranger to very many than these Eastern matters. No one can hope to thoroughly understand that Eastern volume, the Bible, says an accomplished lady, till he or she "has lived for some years in an Eastern country and among Easterns" and their surroundings. Indeed, it may be affirmed with truth that the more we really know about it, the more there is yet to be known, and the circle expands as we go on. We must needs confine our hasty thoughts here to matters artistic and architectural, with but a note here and there to further illustrate these.

It is really surprising to note how little we know in detail, and mode of special construction, of Eastern architecture. Here, with us, all to a certain extent is plain; and we know how a building is "designed," and how it is brought into existence and completed; and can refer, if need be, to the "precedent" it is commonly drawn from. But in a far-away Oriental town, all these conditions so necessary here, are absent, and a something else must needs take the place of them. What is a common living-house in Delhi, or Morocco, or Jerusalem, or Damascus? What sort of building is an Oriental inn? What is a mosque, and what its surroundings and uses, special and particular? Things of note these, and well worth the looking at, and into, for they tell of matters and ways as old as the historic world itself. We are, it must be confessed, a good deal at a loss for evidence in detail of the very things which would throw light on these problems. They are things which but few travellers, even with art proclivities, care much to go into. Bishop Heber, a kindly and observing man, complains a good deal of the narrowness and inconvenience to him of the streets and ways up and down which he was compelled to go in his Indian mission journeys. But it was in these very narrow ways that he found so much to interest and instruct him; so much so that he could hardly bring himself to wish they were otherwise! In some narrow way wherein the houses or huts on either side of it could be touched by the outstretched hands at the same time, he not unfrequently came across the entrance, ruined though it might be, of some small temple or other building, of such marked beauty and refinement of detail, that he could but pause to look at and make note of it, the meanness of the materials, (common brickwork and plaster), notwithstanding,—the beauty of the "handwork" and the delicacy of the design quite captivating him, in spite of all inconveniences, and even "horrors," all about it. One or two he specially notes in Delhi and Benares. He more than admired the way in which very small buildings made up for their want of large dimensions by the elaborate beauty of their details, and by the advantage, so cleverly taken, of position. There is, there can be no doubt, a whole world of art and architectural thought to be met with in these Eastern cities hitherto unnoticed, and we might well look to it while there is yet time, and before it altogether disappears. The India Office might do much at but little cost. We could well point to many things in detail if occasion called for it. It is not here and there only, but all over the Eastern world that such are to to be met with, and not only in public and well-known buildings,—world-famous not a few of them; but in smaller and more out-of-the-way localities: in buildings hidden away almost in the narrower ways and in the darkened courts of the Oriental cities and lesser towns. We may note here that if the Eastern man, as an artist-workman, be remarkable for his skill in stone and marble cutting, not less so is he in his manipulation of common *plaster*,—commonness of material does not stay his hand. Among those many buildings, of which we know really so little, which go to make up an Oriental town, there is none more remarkable and exceptional in character than a mosque. What is a mosque? It would seem a little strange, considering its importance in Eastern life, and the place it holds in it, how little there is in the "illustrative" and architectural way to be met with about it. It may be of interest to give a general idea of one of these buildings. The leading idea or plan being pretty much the same all the Eastern world over, mosques differing only in size, and in elaborateness, more or less, of detail and costliness. It is very simple on plan,—a simple square or parallelogram,—and in size from a few feet across, as small, at times, as 12 ft., to 300 ft. to 400 ft. square. Most commonly, though not always, a mosque of any size,—the larger ones especially,—consists of an open court, with a fountain in the centre of it; and round this court the mosque proper is built, consisting simply of a covered-in building, or "porticoes," supported by columns, indeed, not a little like an old-fashioned inn-yard, the covered buildings, or porticoes, being open to the inner court-yard, or central space, round which they are built. One of these,—that in the direction of Mecca, to which the worshipper turns,—is usually deeper than the other three, and contains the "furniture" of the sacred structure. Indeed, the idea of a building of this kind is simplicity itself, for a common room may become a mosque with a little adaptation; and, indeed, it does not differ in plan from an ordinary Eastern house. Supposing, therefore, to take a general idea, three of the covered-in sides to be supported by a single range of columns and outer wall, the fourth side, being deeper, would have a double or triple row; and these, with a tower or "minaret" in one corner, would make up the building. This arrangement admits of any amount of extension and degree of costliness. Some of the larger mosques have from 300 to 400 columns, as reported by Dr. Bartle. One side or end,—as we have said, that pointing to Mecca, more correctly written "Mekker",—contains, first, in its end wall, the "Mehrab," or niche, which marks always the direction of Mecca, and to this the congregation turn during prayer, or while the Koran is being read, or rather chanted, in a quite peculiar manner. This Mehrab is most elaborately ornamented at times.

To the right of this niche is the Nimbar, or pulpit, with some peculiarities of construction, but used for the purpose indicated by the name. So far the "furniture" is simple enough, but opposite to the Mehrab, or niche, and in the centre, or forepart of the end portico, there is, at least in all the larger mosques, a platform supported by slender columns and railed in by a low parapet, and from which a portion of the mosque service is repeated, as by a choir. It may be somewhat difficult to get at the precise origin of this chanting-desk, which might lead to much else that is a little obscure, but it has a prototype in the "reading-desk" of the synagogue. By the side of this platform, or in front of it, are one, and sometimes two, seats or chairs, with low desks in front of them, from which a chapter is read from the Koran to the assembled congregation. The walls of a mosque are usually quite plain and unornamented, but in some of them a long frieze, or panel, runs round the end wall of the building, filled with texts from the Koran, written in long and bold letters, always admirably executed, and which have a striking effect, and not a little appropriate, and to the purpose. This writing on the wall might, perhaps, be imitated elsewhere with some advantage. The pavement of stone or marble is covered with matting, and at times with costly carpets. No distinction whatever is made; wealth and poverty would seem here, at least, to be on a level. Nothing, as we have said, can possibly be simpler in idea than a mosque; and certainly the main purpose of it, whatever its shortcomings, is not less so. The domes, which form so conspicuous a feature in the view of an Oriental city — as much so, perhaps, as the minarets themselves — are striking parts of mosque architecture. The angles where the porticoes meet, and the space before the niche, and sometimes, indeed, the whole length of an arcade or aisle, is roofed over by a succession of small domes. Many mosques are wholly covered in, the smaller ones especially; and it must not be supposed that all the interest, even architecturally, is to be found in the larger and more imposing structures, for many of the most rude in construction—as in out-of-the-way Africa—are full of strange conceits, and simple and primitive dignity. Carried back even farther than we have done above, the origin of the mosque will be found in a short piece of walling to mark the direction of Mecca.

We might now go into almost any amount of detail, and take note of things from which some novel modes of work might be hinted at, but must needs forbear. But we must not forget the "minaret," an essential item in mosque architecture. The minaret, or, more nearly to the Arabic "Mad'neh," is to a mosque what a tower and spire are to a church. The church-bell calls to church; the mueddin, or crier, from the mosque minaret calls to prayer in a yet more striking and instructive way. At sunset, at nightfall, a little after midnight, an hour before daybreak, at daybreak, at noon, and afternoon, are these "calls" made. The "adan," or call to prayer, is surely one of the most striking and poetic of acts done under the sun in these somewhat prosy days. It was the happiest thought of the founder of El Islam. It built the characteristic minaret, and made of all Eastern cities a stone, or brick, or even plaster dream, and what is lacking, if anything, in the material beauty and picturesqueness of the structure, is made up, and more, by the use it subserves. As the sun sets and rises, and in the darkness and stillness of night, there always comes at stated times from those minarets the "call to prayer." None who can hear can mistake it. The "criers" are chosen for the strength and clearness and sonorousness of their voices, and "Alla hu akbar," "God is most Great"; "There is no deity but God"; and the invitation, "Come to Prayer, Come to Security," and specially in the stillness of night,—"Prayer is better than sleep,"—tell the simple and yet living faith of those who build for utility as well as for beauty!

EARL SPENCER'S PICTURES AT SOUTH KENSINGTON.

THE rooms left vacant by the transference to Trafalgar-square of that portion of the National Collection which was at the South Kensington Museum are for the present occupied by the interesting collection of pictures, chiefly portraits, lent by Earl Spencer. Some of them are generally known through their having been seen at different temporary loan exhibitions of late years, but their interest is the greater for the opportunity of comparison afforded by seeing them together here. A special point in the collection consists in the juxtaposition of a good many portraits of eminent painters executed by their own hands. Of these, perhaps, the most remarkable is that of Murillo, who is represented looking from an oval frame or border, painted to resemble stonework, and on the margin of which one hand rests. The painter's broad square countenance, rendered more massive in appearance by the thickish loose hair which stands out on either side of it, rather recalls the physiognomy of a certain great pianist, who was one of the lions of the recent season; the force and character displayed in it are of a nature different from what one would associate with the artist's works. Beneath the painted frame we read on a label the inscription, "*Bart. Murillo, seipsum depingens pro filiorum votis ac precibus explendis*" ("painting himself in fulfilment of the prayers and entreaties of his children"). There is no pretence or littleness about the work, though it has not the rugged power displayed by Velasquez in portraiture. Cuyp's likeness of himself, on the other hand, which hangs near, is that of a rather fine-gentleman painter, in an "attitude," with his hand on his heart, and a tall hat on his head. Sofonisba Anguisciola, whose portrait hangs next to his, should have been a woman of considerable power and independence of mind, if her countenance is any indication of her character; she plays on a spinet, turning, however, from it toward the spectator: one wonders if it were as a foil to her own countenance that she put in that of the ugly shrivelled woman who stands in the background. Bordone and his mistress, that type of the full-blown Italian woman whom Browning is fond of describing, and who appears so frequently in this artist's pictures, form a portrait group which is interesting rather from the good looks of the pair than from any individuality of character. The reverse precisely is the case with Rembrandt's portrait of himself when young. He represents himself, with perfect frankness, as a very ugly, sulky-looking young fellow, with a face full of

character, thin, with projecting lips; a red turban and a dirty-green robe: altogether he is no attractive person outwardly, save in virtue of his marked individuality. One would not expect to find Rembrandt painting a "finicking" picture of himself; and it is odd to find Richard Wilson doing so, and representing himself as a more genteel and "proper" man than he probably was at all wont to appear in reality. His portrait is well executed, though rather weak in style. Next to him is that charlatan, Verrio, who looks a kind of Shylock, with his low wizened countenance and great round spectacles. Lely's own portrait, on a small scale, is of course in a very grandiose style, full of flowing cloak and everything of that kind; and over him is a still smaller and much damaged portrait of Watteau, who represents himself turning the handle of a mechanical lute or "hurdy-gurdy," and leering like Yorick in the Sentimental Journey. One would have liked to see a pleasanter representation of so pleasant a painter.

Tintoretto's portrait of Luigi Cornaro is one of the most masterly works of the collection, especially in regard to the richness and fulness of texture of the old man's crimson robe. A curious contrast to this is Titian's broadly painted, matter-of-fact portrait of Loyola, of the ungainly face and figure, a portrait which one would fancy Titian would paint with little sympathy, and which looks indeed as if almost defiantly treated. A notable picture in a way is the triptych, by Schoorels, in the same room, reminding one in feeling and manner of Quintin Matsys; the connexion (if any is intended) between the three leaves of the painting is not very obvious. Vandyck's "Dædalus and Icarus" is a beautiful specimen of the painter, in a rather unusual style and subject; the conception of Icarus, a young and almost feminine-looking figure, with thick masses of light hair, is very fine; in a certain feeling of design which pervades it the figure reminds one a little of Etty, though with a difference. Gainsborough's and Reynolds's two paintings of the "Duchess of Devonshire," if less solid in execution than the Italian portraits (and they certainly are so in a very marked degree), yield to nothing in the collection in grace and freedom of style: the Gainsborough carries off the palm, however, to our thinking; a nobler figure, and in a finer attitude of unstudied ease, combined with dignity, it would be difficult to imagine. And, after all, this style of our English painters is perhaps a truer portrait style than that in which the costume is so elaborately wrought out in all its minutest details. A specimen of the extreme of this mode is seen in Antonio More's "Philip II.," which might really be described as a rich costume with a head at the top. With Reynolds and Gainsborough, at all events, the person is the chief interest rather than the dress.

A curiosity among the English pictures is Hogarth's View of the Green Park, from Piccadilly, with a formal square pond in the foreground, around which rather stiff figures are walking. Spencer House and some of the adjoining houses flanking the park are seen on the left, old Buckingham Palace on the right, and in the distance appears St. James's Park water; the painting is of more value as a representation of things that have passed away than from its intrinsic qualities as a work of art.

THE ARTISTIC AND INDUSTRIAL EXHIBITION AT COLOGNE.

THIS Exhibition has not belied the promise of its promoters. It is a rich picture of German genius, vivid with the historical German thought. There is no region of the world, probably, if Italy be excepted, which is, in itself, so magnificent a studio; but even Italy must be put apart if we would appreciate the full purport of the display now offered on the banks of the Rhine. The official report is addressed, as a matter of course, to the German Emperor, and deals, in chief, with works of art, "up to the end of the eighteenth century." The space at disposal was not in any way ample, yet it has been admirably utilised. Four rooms of the Casino are filled with tapestries, arms, ceramic specimens, examples of metal-work, and wood and ivory carving. The administration of the Exhibition announced, among other points of interest, the celebrated treasures of art, so long cloistered in the Cathedral of Cologne, the seven-branched bronze candlestick reputed to have been among the possessions of a sister of the Emperor Otho III., and other magnificent antiquities of a like character. With them, we find a splendid assemblage of tissues, some Persian, and dating from the sixth century. It is grievous to note, however, that Cologne, like Dusseldorf, has been remorselessly despoiled, in the course of wars and tumults, and scarcely possesses a gallery, in either painting or sculpture, of its own. At the same time, the remark is naturally made that Germany considers art as a province peculiarly, if not exclusively, her own, which is a narrow view, and one she would not seriously sustain if challenged. In fact, at Cologne, two schools are conspicuously illustrated, which in no sense can be called Germanic. These are the Flemish and the Dutch, though the Italians, Spaniards, and English occupy a considerable space. We pass some of them as too popularly known,—the copy from Poussin, in the Doria gallery; the trio made up by Murillo, Velasquez, and Ribeira; and it may even be permitted to merely glance at the world-famous works of Rubens and Rembrandt. There are, on these walls, pictures that are, so to speak, obscurities to the common knowledge, and yet which are essential to the historical understanding of art. Thus, the canvasses of Madrazo. He was the Reynolds of his country and his day, but he painted the portraits of only queens and princesses, and is not vulgarly known. Yet neither Murillo nor Velasquez could draw with a more true and tender grace. It is in getting rid of these traditions that art-exhibitions have their educational value. We do not need to pull down Velasquez or Murillo; but to do justice to the neglected and misjudged Madrazo. It was not his fault that the Duchess of Alva was ugly, any more than that her husband was a monster; but we turn now to another illustration at Cologne. Was M. Ribeira, in his portraits, or dramatic groups, the equal of his master, Paul Delaroche? No; but he excelled him in sentiment. It is doubtful, however, whether the signatures on the canvasses at Cologne are universally genuine. Two of the reputed Murillos most certainly are not, and, indeed, may be traced to the Palais-Royal pencils of a nineteenth-century date. They may be faithful as imitations; but they are spurious, nevertheless. In Germany, however, and in all countries fringing upon the Flemish borders, criticism is more acute with reference to Dutch and low country art generally than with respect to that which is foreign. At Cologne, a "Last Judgment," an "Adoration of the Magi," a "Medusa," or an "Assumption" might pass current, although a forgery; but not a false Gallait, Wouvermans, Verbœckhœven, Robbe, or Kievs. No; Kievs, of Amsterdam, could have no copyist, except his teacher, Rembrandt, or his rival, "single-candled Schendel," the "artist of oil and wick," who said, "If I cannot paint the sun, I will study the lamp." Inevitably, there are many Rhenish landscapes; many sketches from Switzerland, as the source and birthplace of the Rhine; and many bits of character and colour due to the primitive genius of Ruysdaël. We must not look, at Cologne, for any illustration of the English school. It is not admired,—perhaps it is not necessary to say that it is unappreciated,—on the Continent. France denies us the gift of painting; Germany refuses us credit for music. Still, the critics of Cologne have discussed our merits, during the last few days, with an approach, at all events, to impartiality. Yet it is a sign of eccentricity, if not of ignorance, to institute an elaborate comparison between the works of Cornelius and those of Landseer. They had no qualities in common, and we will venture to assert that there is not an original Landseer in the galleries at Cologne. We might as well, speaking from a far-off distance, compare Raffaelle with Rembrandt, or Rubens with Da Vinci. Let each school be studied and understood by itself, and then the study of contrasting art may be made profitable. Van Loo and Watteau, and Boucher, are, in their way, sharers in the glory which belongs to Michelangelo and Titian; yet the German habit of analysis which compares them is altogether pedantic. The Cologne critics, again, fancy themselves to have made a discovery in pronouncing that Wilkie was not Hogarth; but they might have waited until anything like such a parallel had been drawn. The English have not been bold competitors at Cologne, and it seems to be forgotten that the design of the Exhibition was not identical with that of a Piccadilly first-floor in the flush of the season. It was not intended to be a cluster of annexes, a strife over prize medals, a Court of Artistic Honour wherein awards were to be given. Invitations, in fact, were not sent broadcast through the length and breadth of Europe. To begin with, after Germany itself, Switzerland, Belgium, Holland, and Bavaria were the only States expected to take an active interest in the affair; and of these four, Bavaria alone has displayed any enthusiasm, unless, perhaps, we except the States of Northern Europe, which rarely fail to struggle for a place among the winners. They have grand traditions to sustain, and they are not, in 1876, unworthy of them. The countrymen of Thorwaldsen especially are jealous of the fame bequeathed to them. So, in their degree, are the descendants of the Swiss, Gleyve and Muyden, and of the Dutch Bischoff, the fellow-student of Alma-Tadema, and teacher of the Polish artists, who, in colour, in concentration, and in energy, are marvellous. Their pictures, "While we Live, Poland is not Dead," "Super Flumina," and "The Curse of the Dead," while rough and wild in execution, are extraordinary in force, and historical in character. It is in the German school, however, as represented at Cologne, that the mind is principally interested. It is not illustrated in its best form. As at Paris, as at Munich, so at Cologne: it is more ambitious than eclectic. We find the mural decorations of Berlin resplendent upon walls that should have been alive and bright with subjects which fill up spaces less vast than those that are demanded for cartoons. Here is Kreutzer, eloquent, at once, upon the Bible, the Niebelungen, and Faust. There is Kaulbach, who flames with all the horrors of the Spanish Terra, in the Low Countries; and the son of Kaulbach, who celebrates, on canvas, Arndt's much-puffed air, "The Watch on the Rhine," which may be forgiven him on account of his splendid frescoes in the Museum of Berlin. It is curious, again, to note some nationalities, or rather provincialisms of German art. We have, for example, M. Knaus, of Wiesbaden, whose tints are all blue, in various shades, with a generally ghastly effect, whether in landscape or composition of groups. His fields are almost of the same colour as his skies; just as the foregrounds of M. Liezenmayer are all of a shadowless white. Still, both these masters possess a charm, and the outlines and hues of their canvasses, whether consonant with nature or not, are attractive. Those grand reminiscences of the great Frederick must evoke strong symyathies in German minds; they are national and historical to intensity. Then from Baden comes a scene in the Forest of Fontainebleau, perfect in its woodland aspects, and thence, the transition is dramatic in its effect, to a wall hung with the interiors of German cathedrals, great Gothic monuments, perspectives of edifices half Pagan and half Christian, portraits of warriors, queens, and ecclesiastics;—Queen Elizabeth by the side of Gustavus Adolphus; John Huss; Arnold, of Brescia; Abelard; Savonarola, and Luther "as he appeared" when burning the Roman bull. The Portrait Gallery is endless,—Zwingle and Calvin, Coligny and Maurice of Saxony, William of Orange, and Barneveldt, with our own Essex and Burleigh, Drake and Thomas Moore, and Cranmer. It is a vast historial allegory, so to speak, illustrated by a magnificent Pilgrim's Progress of heroes and martyrs through many generations of human life. More than this, however, it is a brilliant illumination, the light of which is cast upon modern German art especially, at a time when this art is, amid the glow and fever of military triumphs, awaiting, perhaps, another *renaissance*. We have confined our present notice to the artistic display at Cologne; but in many other respects, it is interesting, and, although limited in scale, it is choice in selection, and does honour to that German spirit which, however exclusive, and always over-patriotic, is loyal to the Arts.

Pipe-Founding Contract. — The undertaking of introducing into the city of Rio de Janeiro an abundant supply of water has been taken in hand by the Government of Brazil, the chief contractor being Signor Gabrielli. It is understood that the execution of the entire contract, which has been entrusted to him, will cost something like 1,700,000*l.*, and that the money will be raised exclusively by Brazil out of her ordinary resources. According to *Iron*, the pipe contract under notice is chiefly for mains of large size, 31¼ in. in diameter, the smaller sizes forming only about 10 per cent. of the whole. It consists of 80,000 tons of cast-iron pipes, and has been taken by three Glasgow firms.

A FRENCH SOUTH KENSINGTON MUSEUM.

ALTHOUGH the proposal of a national subscription "for the foundation and organisation of a South Kensington Museum,—a Museum of the Decorative Arts" in connexion with the *Union Centrale des Beaux Arts appliqués à l'Industrie*,—appears at first an inadequate means of establishing so important an institution, the commencement of the *Union Centrale* has been so well considered, and the earliest efforts so completely carried out, that many believe in the ultimate success of the project.

We not long since visited the library of the *Union Centrale*, which is situated on a first floor in a delightful old house in the Place des Vosges (the old Place Royale), the front windows of which look on to the quiet old quadrangle, and the windows of the rudimentary museum at the back on a fine courtyard with a terraced flight of steps of the time of Louis XIV.,—the visit reminding one slightly of a visit to the old British Museum in the days when Sir Henry Ellis and Montagu House existed.

So highly is the directory of this museum esteemed in Paris, and so much have they done, within the last ten years (the limit of its existence), to supply precisely the kind of information that all workmen, in whatever field of labour, seek for, or ought to seek for, that Marshal MacMahon, doubtless at the suggestion of M. Senator Krantz, has requested M. André, the director of the *Union Centrale des Beaux Arts*, to take part in the superior commission of the Universal Exhibition of 1878.

Such a request, indeed, seems obvious, when we recal the all but exhaustive work that the *Union Centrale* has done for Paris. The splendid show of Japanese art, the first Oriental Congress visited four years since; the interesting history of costume two years back; and now at this exhibition at the Palais de l'Industrie, the history of tapestry is shown by a magnificent suite of nearly three-hundred pieces of tapestry, dating from the fourteenth century to the work of the present day, when you may see workmen at the loom, producing designs feebly adapted for the purpose, but perfect in mechanism, both in the *haute lisse* and the *basse lisse*.

The French have a faculty apparently for arranging exhibitions.

Twenty years ago,—twenty-two in reality,—the town of Bagnols, in the Department of Gard, near Nîmes, possessed a *bibliothèque musée*, or a library and museum, founded by M. Léon Alègre. Seconded by some chosen friends, and encouraged by intelligent administrations and ministries, M. Alègre has succeeded in giving his natal town an establishment which we dare to say is almost model.

The end which the founder proposed was to attract the curious and the visitors, and to instruct them through their eyes, and to moralise them through the study of the books and different collections put at their disposition. It is in the *Hôtel de Ville* that this museum and library are situated. Five rooms are given up to the collections, which are as varied as they are important.

The first room contains, besides a plan in relief of the Department, all the specimens of mineralogy, geology, and palæontology peculiar to the locality; natural history is represented, not only by pictures, but by types methodically classified; conchology, ornithology, botany, ethnography, &c. A glass case contains the objects connected with the study and products of agriculture.

Another series of cases is devoted to the industries of the locality and its environs, pottery, glass-making, iron, silk, paper, hats, charcoal, &c., from the raw material to the worked-up and finished object.

The second room contains the library, properly so called; the books, to the number of 4,000, are disposed in such a way as to form two groups, of which one is specially reserved to the popular library; splendid illustrated publications, all the military and other geographical maps, and plans and maps in relief.

The third room is given to the *histoire de travail*, commencing with an interesting prehistoric collection, the age of stone, the ages of bronze and iron, antique medals, Gallo-Roman objects found in the country; Middle Age and Renaissance types; products of Egyptian and Oriental art, brought back by intelligent travellers or by friends, enrich other cases.

Further on in a gallery uniting the two buildings are casts of all the inscriptions of the Canton, Gallic epigraphy, Greek, Roman, and Middle Age, even in *langue d'oc*.

Then opens out a vast room consecrated to the fine arts. By the side of some beautiful paintings, given or lent by the State, the founder, who has brought together the works of Flandrin, Yvon, Roqueplan, Roybet, De Segues, Laurent, &c., has classed all the different kinds of drawing, crayon, tinting, water-colour, body-colour, engravings since the earliest periods till 1876 (changed from time to time in their frames), lithographs, oil-paintings, wax-paintings, enamel, lava, glass, wood, &c., and all this to show the types of the varieties of the interpretation of art. Casts of some beautiful statues, vases, bas-reliefs, give in the museum of Bagnols a high idea of antique art.

In this same room are also the portraits of all the illustrious or distinguished Bagnolais:—Rivarol, Gentil (viceroy of Hindustan), General Teste, Admiral Bompard, Gensoul, De Roussel, Madier de Lamartine, &c.; Father Bridaine, Archbishop Menjaud, &c., painted and presented by the founder. There is also a modest monument erected to the memory of the young soldiers who were killed during the war (1870-71); fifty-two soldiers, natives of the canton of Bagnols, died for their country during that fatal war.

In the fifth room are collected the products of industrial art. A series of casts teaches the novice how to distinguish Greek and Roman art, that of the Middle Ages and the Renaissance; a vast picture painted by M. Alègre, a *resumé* of the great works on polychromatic design of Racinet, Lièvre, and Owen Jones presents the history of decorative art from the time of the Egyptians to Louis XVI.

The local products, models for locksmiths, timber-work, carpentry, modelling, sculpture, galvanoplastic, church windows, art of weaving silk, carpets, wall-papers, a series of apparatus for experiments in physics and chemistry, &c. All this offers a whole of the most interesting nature, and captivates the attention of the *savant* and the erudite, as much as it pricks the curiosity of the man whose knowledge is but little developed.

Let us avow that few towns or even large cities in England have an establishment of instruction and curiosity as complete and as extended as this museum and library of Bagnols.

The founder, M. Alègre, who is at the same time the curator, has placed in the most conspicuous parts of the rooms a number of significant inscriptions, of which here are some of the principal:—

"Let us aid each other and love each other",—motto of the Société d'Encouragement au Bien, of which the curator is a laureate. "Reading is one of the duties of an honest man" (Christine de Suède). "To see, to understand, and recollect, is to know" (Rubens). "There are three kinds of ignorance,—To know nothing; to know badly that which one knows; to know something else but what one ought to know." Under the bust of Lafontaine,—"Work is a treasure." Lastly, under that of Franklin,—"Those who pretend that one can arrive at something without work and without trouble are poisoners."

M. Alègre has rendered his natal town a signal service in putting within the reach of all his countrymen practical instruction and good counsels. We add, with great pleasure, that he is rewarded for his devotion by the gratitude of all; and what touches him more still, by the numerous visits made to his bibliothèque-musée.

WEST HARTLEPOOL.

OF all the new towns in the North-Eastern district, which has been this century prolific, there is none which has a more wonderful growth than West Hartlepool. Middlesbrough, with twenty years more life, has attained to greater dimensions, but its growth has been practically unchecked. Jarrow has revived an Old-World name, but it is yet a comparatively small town, though incorporated. Others have made wonderful strides in a generation; but in none, from so small a nucleus, has there been so great a growth by bounds and starts, with pauses between, as at West Hartlepool. Not thirty years ago its site was fields, its docks and harbour were pastures and sandy shores, its rolling-mill grounds were then rabbit warrens, and only a farmhouse, a mill, and half a dozen seaside cottages occupied the site. The township of Stranton, within which it is almost wholly situated, had a population of about 380, and one of the best Gazetteers of that day described it as "inconsiderable both in its population and trade." The excellence of its place for purposes of export and import trades was appreciated; docks were constructed, the ancient Clarence Railway was extended to it, trades gradually centred themselves there, and thus a town of 30,000 people has arisen on what were erewhile sandy shores and agricultural lands.

The first trade planted in West Hartlepool was that of coal export. In 1847, the first dock opened, and in that month the shipments of coal amounted to 2,500 tons, and for the year they amounted to 54,202 tons. For some years there was a tolerably regular increase in the amount of coals shipped, and in 1861 close upon a million tons were shipped, but from that time for some years the increasing home demand caused the shipments to fall off until they sank down to scarcely half a million tons for 1873. With the depression in the iron trade the export of coal has again increased, and now the shipments are at the rate of about three-quarters of a million tons yearly, those for the latest month tabulated being fully 98,000 tons; whilst the vessels entering the port (numbering in the first year of its existence 460), were in that month 537, and yearly amount to close upon 4,000. Five years after the opening of the first dock a second was opened, and from that period the import trades—on which West Hartlepool largely depends—date their commencement. First, however, it may be said in a sentence that the export of goods other than coal and coke began with a value for 1853 of 23,846*l.*, and rose till it reached its maximum in 1861—the amount then being close upon six millions sterling, falling, however, until the low value of one million and a half was reached in 1869, to recover until now the amount is between two and three millions. The imported goods include grain, cattle, timber, and general goods. Beginning in 1852 with 16,000 quarters, the grain trade has assumed large proportions, 300,000 quarters being now yearly imported, and the amount being now largely increased, until in the month alone to which reference has been made about 58,000 quarters were imported. The extent of the general goods imported in the first year was about 5,000 tons,—a quantity now multiplied tenfold. The live-stock trade is not so extensive, but the thousand heads imported two dozen years ago are now multiplied thirty-fold. The timber trade has known a vast increase from the 500 tons with which it began, the quantity imported last year being about 350,000 loads, whilst a vast increase is this year being known to an extent indicated by the fact that one month's imports were 68,956 loads. To meet the needs of these trades, the docks have had to be enlarged in number, and now a deep-water dock of large capacity is in course of construction. With this the dock area will be about 50 acres, the timber-ponds cover nearly 100 acres, and the yards for the storage of timber occupy above 100 acres; and yet merchants ask, like Oliver Twist, for more.

Manufactures were begun, so far as shipbuilding is concerned, twenty-two years ago. Now, in normal times, a tonnage of ten to fifteen thousand tons is launched yearly. The iron manufacture has been commenced, and there are three blast furnaces, and about 150 puddling furnaces at the works, whilst the dulness of these now is, alas! the general fate of others in the district. The nut and bolt trade flourishes to a certain extent; the creosoting of timber is largely carried on; and the saw, planing, and joinery trades are to an extent greater than in most other towns in the North; whilst for years briskness has characterised the building trades. As the result of these, the population of some 380 rose by 1851 to nearly 5,000; by 1861, it was 13,600; by 1871, there was a further large increase,—to 22,124; and now its population may be taken as about 30,000.

At present, although the stagnation in the iron trade is a serious drawback to its prosperity, yet the unparalleled activity in the timber trade largely counterbalances this. Extension is in various directions going on. The school accommodation was sadly deficient, and the School Board has now in course of erection and in contemplation schools for 2,000 children; several ornate additions to its chapels have recently been brought into use; its docks and quay accommodation is being enlarged, and its graving docks are to be numerically increased. A new branch line of railway is now approaching completion; and another, in the future, will bring it

nearer to the vast deposits of ironstone in Cleveland, so that its prospects brighten beyond the present. It depended, in early days, on forced trade; and when, fourteen years ago, its parental company got into difficulties, it experienced the results of the sudden stoppage of the forcing process, and again under somewhat similar circumstances, four years later, its growth was arrested. It is now no longer dependent on one company's forcing, as at first, nor upon one industry, as in the second stage of its growth; but, drawing its life from varying trades, it finds the advantage in times like the present when one is depressed so greatly. It has latterly had no patron, such as Barrow, its west coast imitator, has, nor has it, like its prototype, Middlesbrough, had the advantage of good local government and oversight. Its inherent merits, its position, its facilities for shipment and for extension, and the fact that immense mineral deposits back it up to the west, are the causes of its growth, coupled with its facility for commanding the trades of the Scandinavian and North German countries. And as further trade facilities are given to it, its future will be more assured, and its growth more rapid, and its progress will be as great and less fluctuating in the future than in the past.

DEMOLITION OF THE CHURCH OF ST. MICHAEL, QUEENHITHE.

THE building materials of the old Church of St. Michael, Queenhithe, have been sold by Messrs. Fuller, Horsey, & Co., and this church will now very shortly be swept away. The remains of a large number of persons buried in vaults within the church have been removed, and several claimed by the relatives or representatives of the deceased re-interred in other places, whilst the remaining portion have been buried in a large new vault, constructed in the yard attached to the church. In disposing of the fabric and the fittings within the church, several memorials have been retained. Amongst these is the memorial-stone of the structure, at the corner of Little Trinity-lane, on which is the following inscription:—"This chvrch was bvrned in ye dreadevl fire in ye yeare 1666, and was began to bee rebuilt in ye yeare 1676. Will. Woodrof Thos. Lyme ,chvrch wardens." The stone, with its inscription, is to be placed in some public building in the City, probably in Guildhall. Amongst the interior portions of the structure to be preserved is the old white marble font, which was in the previous church. It was found amongst the ruins after the fire, and with the exception of cracks from the heat of the flames, was uninjured. After being repaired it was placed in the edifice now about to be taken down, where it has since remained. Within the last few weeks it has been re-erected in St. Paul's Cathedral, as well as several of the old monuments and tablets. The old carved oak pulpit and canopy have likewise been retained, and now stand in the church of St. James, Garlick Hythe, whilst the stained-glass windows have also been preserved, and are to be transferred to a new church now in course of erection in the parish of St. Pancras. Schools and a rectory-house will be erected on the site.

THE PROPOSED STREET IMPROVEMENTS IN CAMBERWELL.

IN the Improvement Bill which the Metropolitan Board of Works intend to promote during the next Parliamentary session, about two hundred houses will be scheduled, and either partially or wholly taken by compulsory purchase, for the contemplated widening of the main thoroughfare between the Camberwell-road near the Green, and Queen's-road, in Peckham, extending to within a short distance of the bridge which carries the London and Brighton Railway over the last-named thoroughfare. Several of the houses proposed to be removed are amongst the oldest in the district, having been built more than two centuries ago, and more than one have interesting historical associations. The estimated cost of the improvements, if ultimately carried out in their integrity, is upwards of 250,000*l*. For the widening of that part of Camberwell-road, near Camberwell-green, from 35 ft. to 50 ft., amongst other property to be taken is the Old Father Red Cap public-house at the corner of Camberwell-green. It is stated to be one of the most ancient establishments of its kind in the district, and noted as being one of those old inns where, in days gone by, the old stage-coaches running to and from London drew up to bait, when bad roads made short stages the rule. Another section of the proposed improvements is the widening of that part of Church-street, Camberwell, from its commencement at the south-east side of the green to a point opposite to St. Giles's parish church. Both sides of the road, and nearly every house and shop between the points named, will be affected by the improvement, and amongst the property which it will be necessary entirely to demolish is the old public house on the right hand side, at the corner of Grove-lane, known by the name of the Hermit's Cave. On the left-hand side of the road a portion of the grounds of the vicarage, opposite the church, will be absorbed by the widening of the road. The most expensive portion of the improvement will be that commencing in High-street, Peckham, and extending to the Queen's-road. Certain portions of High-street are at present only 19 ft. wide, and as the intention is to make the entire thoroughfare, from end to end 50 ft. wide (including the footpaths), it will be seen that extensive portions of the frontages of the property on each side of the road will necessarily have to be taken, and in carrying out this part of the improvement alone upwards of 120 houses, shops, and other places of business will either be entirely or partially taken down, and in those instances in which portions of the sites of existing premises are not required, new frontages will have to be erected. This part of the improvement will take in a house in Queen's-road, which is said to have been built nearly three hundred years ago. The interior of the premises reveals their ancient character, the walls and other portions of the internal workmanship being elaborately carved and panelled in oak.

THE JOHANNESKIRCHE, STUTTGART.

THE principal Protestant churches of Stuttgart, as they still stand at the present day, were erected in the fifteenth century, at a time when the town numbered only 4,000 inhabitants. When the Reformation came, with its more simple rites, the three churches were sufficient for the religious requirements of the population; but when the latter increased to nearly a hundred thousand, more accommodation was wanted. It is a testimony to the reawakening of religious life in Stuttgart that, besides the Church of St. John (the subject of our illustration), five more churches are either near completion, in course of erection, or projected. But it is also from an architectural point of view that Stuttgart may be congratulated. If formerly one of the hills surrounding the city was ascended, a panorama causing a peculiar impression spread itself around; the handsome frame of hills did not agree with the picture which it inclosed. It seemed as if a beauty wished to supplement a deficiency of charms by sylendour of frame. Only the Stiftskirche, the principal church of Stuttgart, in connexion with the old ducal castle, as seen from the east, formed an architectural picture of exceptional merit. This was the only point which, towering above sea of black roofs, succeeded in attracting the eye.

All this will be changed in future. The sepulchral chapel on the elevated Campo Santo has become a dominating point. Soon the new Roman Catholic Church, with two towers of equal height, will follow; and at the same time, or perhaps somewhat earlier, will rise the Garrison Church, with two towers at the entrance, and with a boldly-constructed dome, flanked by four towers. At Heslach, a suburb of Stuttgart, the erection of a new church has long been resolved upon, and the erection of the sixth of the new churches, the Friedenskirche, which is to supply the spiritual wants of the part of the Würtemberg capital lying between the city proper and the suburb of Berg, is only a question of time. If we now take also into account the new railway terminus, the site of which on the Hasenberg Terrace is 300 ft. above the level of the Feuersee, the Stuttgarters are perfectly right in assuming that the monotonous features of their city will be considerably changed and animated within the next five or six years.

The Johanneskirche affords a first indication of what the aspect of the Swabian capital will be in future. The church is situate on a tongue of land extending into the Feuersee, which was regulated ten years ago, and it is surrounded for two-thirds of its length by the lake. Our illustration is a choir view of the church, and shows in the background St. John's School. All the principal parts of the church are shown. In making a regular inspection of the church, we turn first to the western tower front.

The tower forms an independent part of the structure at the point where it reaches the eaves of the roof; here is the first gallery, of which there are altogether three. Over the belfry rises the spire of the tower, in which openwork and closed panels alternate. The former impart to the tower, even when seen from a distance, a great charm. But of especial interest is its constructive design; the outlines of the spire are not straight, but they show a swelling of about 7 in. at the highest point. This entasis prevents the pyramid from appearing too slender. The tower has a height of 227 ft., measured from the pavement to the top of the stone structure.

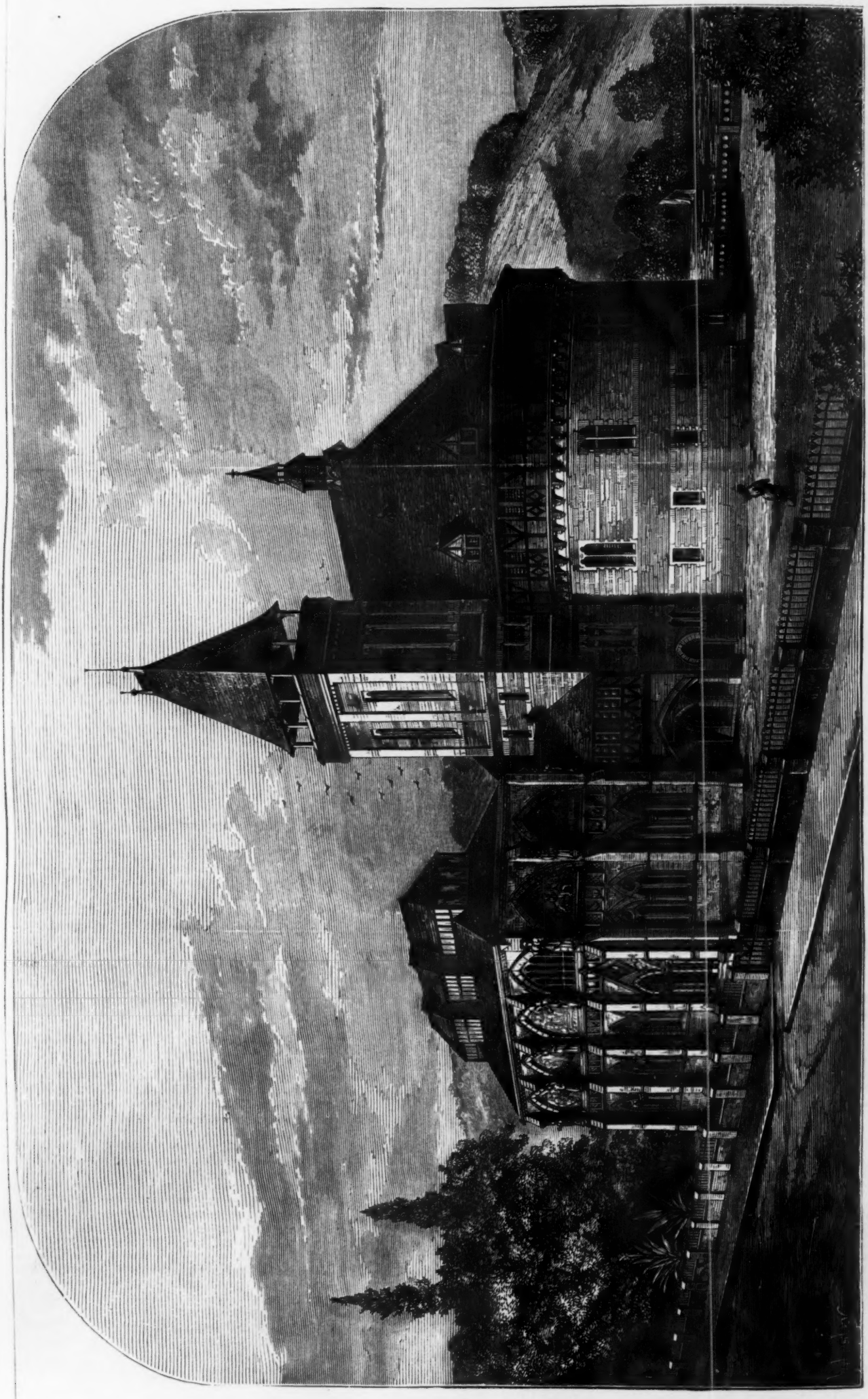
The western front has three entrances. We find first an ante-chapel, with stairs at the sides leading to the galleries; and from here, after passing the doors of the tambour, the interior of the church. Similar arrangements are met with in the entrances to the aisles; from these porches also the galleries may be ascended, which are thus reached without disturbing the assembled congregation. The ground-plan shows a design of nave and two aisles. The nave is crossed by a transept, and is separated from the aisles by pointed arches; the transept has flat arches. The whole building differs in its style only very slightly from a Roman Catholic church, with the exception, however, of the choir. The spacious choir required for Catholic rites can, in truth, be dispensed with in the simple forms of Protestant worship. The choir here consists of the five sides of a regular octagon, and is not very deep. The church receives its light from three rows of windows, placed above each other; the first row is in the walls of the aisles; over this the second and most pleasing; the upper row being placed in the centre nave. The whole church is so profusely painted as has hitherto been hardly considered compatible with a Protestant place of worship. The ground tone is the yellow-greenish-grey sandstone of which the whole church is constructed. Only the moulding, the pillars, capitals, panelling, &c., have the natural colour. All the vaulting is painted, but especially the keystones of the arches. An increase of colour, as in the decorations of the walls, is perceptible in the stained-glass windows. In the windows of the transepts three bright colours are placed together to produce effect; while, with the exception of the half-length figures of the twelve Apostles and four Prophets in the lower row of windows, all the windows of the nave are decorated only by geometrical patterns; the choir windows show figurative representations. The choir itself has golden stars upon a dark-blue ground, with vine-branches and ears of corn. We find here, also, the painted emblems of the four Evangelists, and in the centre panel the Lamb, resting upon the Book closed with seven seals. Below the pulpit, surrounded by pillars of red and green marble, stands the statue of the Reformer Luther; his right hand rests confirmatively upon the Bible, supported by the left arm. An eagle with extended wings serves as lectern. The body of the pulpit consists of a balustrade, between the uprights of which variegated tapestry appears. The sounding-board is a piece of elaborate Gothic carving. The organ is a good piece of work. The seats as well as the doors are of heavy oak. The church offers sitting-room for 1,600 people, and there is room altogether for 2,000.

The name of the architect has not reached us.

THE PROPOSED SHAKSPEARE MEMORIAL THEATRE, STRATFORD-ON-AVON.

OUR readers have been informed on several occasions of the projected erection in Stratford of a Theatre, Library, and Picture Gallery, as a memorial of Shakspeare, and of the steps which were taken to obtain plans. The accompanying engraving is a view of the design submitted by Messrs. Dodgshun & Co., which has been selected as the most suitable. The building on the left hand is that intended for the Library and Reading-room, with Picture Gallery above.

If there should be any serious intention to carry out this design it should receive careful revision. According to the plan which has been published, not half the people sitting in the dress-circle would be able to see half the stage.



PROPOSED MEMORIAL THEATRE, STRATFORD-ON-AVON.—SELECTED DESIGN.

THE JOHANNESKIRCHE, STUTTGART.

RESTORATION OF THE ERECHTHEUM AT ATHENS.

WITH reference to Mr. Fergusson's paper, on the "Erechtheum at Athens," read at the ordinary general meeting of the Royal Institute of British Architects, on February 14th last,* the following communication from Dr. Forchhammer, of Kiel, has been received by the Institute:—

Mr. Fergusson, D.C.L., F.R.S., F.R.I.B.A., has lately published a very interesting paper on the most interesting building of Athens,—the Erechtheum, a copy of which the author has been kind enough to send to me. Mr. Fergusson considers the edifice chiefly from an architectural point of view. The less he regards the religious character of it the bolder he appears in arranging the single parts of the building. He reads the riddle, but by putting outside what should be inside he creates another enigma. I do not intend to criticise the ingenious construction of the temple propounded by the successful author of the brilliant restoration of the Mausoleum at Halicarnassus. I prefer to give my own explanation in concordance with what I lately have published in a book entitled "Daduchos, Einleitung in das Verständniss der Hellenischen Mythen, Mythensprache und mythischen Bauten. Kiel, 1875."

Before entering into the question and explaining the building and its parts we must recall to the memory of the reader the following thesis:—

a. The whole building was a religious one.

b. With it were connected a number of religious fables, belonging to the earliest times of Athens.

c. In these there are at least some very clear indications of the primitive physical character of the Athenian and Greek religion. An olive-tree was growing within the temple, the testimony of Athenê's benefit to the land. That tree could not exist without water and air. Then there was water or a lake, created by Poseidon, and bearing the name of Erechtheus, who at the same time was called Poseidon, and worshipped as Poseidon-Erechtheus. Further there, was a sanctuary of Pandrosos, the goddess of dew. In that sanctuary grew the olive-tree.

d. Besides the temple of Athene Polias and Pandrosos, there was a sanctuary of Erechtheus, a subterraneous chamber of Erechtheus, and a subterraneous chamber of Cecrops, the father of Pandrosos and her sisters Aglauros and Herse. Further, there was a portico of the "Korae" or Caryatides. The body of Cecrops was said to end (instead of in legs) in a serpent; and also Erechtheus was in his lower part a serpent. Pausanias, 1, 24, 7, says, the serpent near to the spear of Athene, in the Parthenon is Erichthonios, or Erechtheus.

Now, I think in any restoration of the building all these peculiarities must be accounted for. It certainly is not sufficient to place the rooms mentioned architectonically, which can be done in many different ways, as is shown by numerous restorations, and now by Mr. Fergusson placing the Cecropion, the Pandroseion, and the olive-tree outside the temple.

It will be desirable, first, to look at the fables, and to try to understand their meaning. Cecrops was married to Agraulos, and father of Pandrosos, Aglauros and Herse. It is quite clear that the father of the three genii of dew, as their name indicates, must be a genius of humidity in some form or other; the more so, as he was married to the genius of the Attik land, Agraulos. It appears, therefore, very probable that Cecrops originaly was a genius of rain. Thus we understand that after death he was elevated to the sky, where he became Aquarius of the Zodiac, whilst on earth he was supposed, with regard to the inferior part of his body, to be like a serpent (*τὰ πρὸς πὸδῶν δρακοντίδης*, Aristophanes Wasps. v. 438), which means, that the rain finishes in serpentine rivers and rivulets (on the symbolic meaning of *δράκων* and *ὄφις*. See my book, "Daduchos," pp. 35–42).

That Cecrops really was a genius of rain I had already proved (1837) in my book entitled "Hellenica," page 67. I had therefore ventured to prophesy, that by excavations there would be found a cistern, being the "Hypogeon of Cecrops," under the place in the Pandroseion next to the portico of the Caryatides, as assigned to it by the inscription (Boeckh. Corp. Inscr. 160). Well, that cistern, with a beautiful double-roofed vault, was found two years later, 1839, and may be seen in Mr. Tetas's drawing, attached to Mr. Fergusson's lecture, figs. 1 and 4.

It was merely a proof of *amour propre*, that Professor Thiersch, M. Raoul Rochette, and the Athenian Commission declared the cistern to be modern, though it is cut in the rock, 1·30 mètre deep, and though some parts of the marble wall of the temple rest on the wall of the cistern. We can now easily understand why Cecrops enigmaticaly was called *διφύης*,—born of heaven; or, if you like, double-natured, or *αἰγυπτιος*= *αἰγ-ὑπτιος*, the hero of the returning waves. Hesych. *αἴγις κύματα*.

This settled, we have to inquire about the wonders in the history of Erechtheus, which is related in the same enigmatical way. The cloud-collecting god of heavens had devoured the vapour-rising daughter of the ocean. In order to get delivered of his pains and dulness, he called the god who makes lightning and thunder to help him. Hephaistos left the clouds, and Pallas, with thunder and storm, rose from the head of Zeus. In consequence of hail and rain, symbolically called the sperm of Hephaistos, falling on the earth, the goddess Gea procreated Erechtheus, the hero of the source or pond Erechtheïs in the Erechtheum. We shall see afterwards how the pond Erechtheïs served to moisten the soil wherein the olive-tree grew.

As for Poseidon, we know that he was not only a god of the sea, but that, being particularly worshipped in Arcadia and in other places which had no connexion with the sea, he is in general the god of moistening the earth, and therefore was called Poseidon, *Ποσειδάων*, *Ποτειδάων*, from *πόσις πότις* and *δα*=*γῆ*. Now, if the Erechthean pond was destined to moisten the soil of the olive-tree (as will be proved by the existing ruins), it appears to be very natural that the god and the hero were worshiped under the common name of Erechtheus-Poseidon. After the rain falling on the temple and its temenos, and after the increase of water in the pond, it discharged necessarily into a rivulet, which was the reason why the Athenians said that Erechtheus finished in a serpent, and that Pausanias declares the serpent near the spear of Athene to signify Erechtheus. All these heroes and gods on the Acropolis were at the same time representatives of the nature of Attica throughout. Erechtheus of the rivers, Cecrops of the rain, Pandrosos of the dew, and Poseidon of the general watering power, and all these divinities were the promoters of the growth and fertility of the olive-tree, the proof and witness of Attica belonging to Athene, the goddess of the air, which receives and adopts every child,—every produce of the earth. I am quite aware that the whole of my exposition of these Athenian fables must be proved by the construction of the building, which I know by autopsy, and which I now am going to describe in a more detailed way than hitherto has been done, admitting some peculiarities recently discovered as antique, following a route of Pausanias, differing from my predecessors, and not altering the evident meaning of the inscriptions.

Pausanias, after having turned from the southern enclosure wall of the Acropolis to the north, commences his narrative of the Erechtheum, viz.:—The great stoa (*οἴκημα Ἐρεχθειον*) at the *west* end of the temple. He first mentions before the entrance to the *οἴκημα*, the altar of Zeus hypatos, which was erected by Cecrops, whose hypogeon was under the sanctuary inside of the wall with windows. Pausanias does not speak of the doorway under the second pillar of that wall, which evidently leads into the Cecropion. Leaving the altar of Zeus hypatos, Pausanias enters the Erechtheum, apparently by the little doorway in its southern wall. This was probably the common, and perhaps the only, entrance to it. The intercolumniations between the six columns probably were enclosed by metal grating, and the great doorway in the wall between the Erechtheum and the main temple was filled in with large regular blocks of blue marble, which I have seen myself. These were afterwards taken away, probably by some unhappy superintendent, who naturally could not imagine that a doorway with so fine a cornice and frames should be closed up, being the forever-closed door (*θύρωμα*) to the hypogeon of Erechtheus. On the Stoa side that filling of the closed doorway was covered by a double door of four large slabs (panels) of black marble inserted into the (white?) frames (*ξυγά*). I think the slabs were of black marble, because they represented the door to the tomb of Erechtheus. The inscription, § 12, denotes this:—IIII. *θύραι λιθιναι μῆκος ὀκτῶ ποδῶν καὶ παλαστῆς, πλάτος πέντε ἡμιποδίων. πούτων τὰ μὲν ἄλλα ἐξειποίητο, ἐς τὰ ξυγὰ δὲ ἔδει τοὺς λίθους μίλανας ἐνθεῖναι.*

Pausanias does not say a word on his further passage to the temple of Athene Polias. No doubt he returned through the little doorway, by which he entered into the Erechtheum, or he passed through a gate in the gratings of the intercolumniations; he ascended then the steps on the north side of the temple, and came in that way to the eastern entrance of the temple, of Athene Polias. Within the temple he mentions the statue of Athene, which was said to have fallen from heaven, and some other curiosities. Then speaking of the olive-tree, which he probably could see from the sanctuary of the goddess, he justly observes that the Pandroseum was (*συνεχὴς*) contiguous with the former. The olive-tree was in the Pandroseum, which apparently occupied the whole lower part of the building. (Apollod. 1, 14, 1.) Besides, there was in this sanctuary an altar of Zeus Herceious, which stood under the olive-tree according to Hellanicus: *Κύων εἰς τὸν τῆς Πολιάδος νεὼν εἰσελθοῦσα καὶ δῦσα εἰς τὸ Πανδρόσιον ἐπὶ τὸν βωμὸν ἀναβᾶσα τοῦ ἑρκείου Διος τὸν ὑπὸ τῇ ἐλαίᾳ κατέκειτο.*

After having placed the three chief parts of the building in their proper sites, viz., the temple of Athene in the eastern, the sanctuary of Pandrosos in the lower part to the west, and the Erectheum in the Stoa to the north, we must return to the latter in regard to some most extraordinary peculiarities.

Pausanias describes the interior of the Erechtheum. There was an altar of Poseidon, upon which they also sacrificed to Erechtheus; and an altar of Hephaistos, the father of Erechtheus; then an altar of Butes (the first priest of Erechtheus-Poseidon), and on the wall the painted genealogy of the Butades. All these things easily can be accounted for. But we have to join to them, from the inscription, the altar of the *θυήχοος*, as is clearly written three times, not *θυήκοος*. ΘΥΗΧΟΟΣ means a priest who brings sacrifices, which are fluid, not burning or smoking. How this was we learn by the following passage of Pausanias:—"The *δίκημα* being double (viz., one above and one underneath, like the *οἰκήματα* in the labyrinth, Herod 2, 148, or like the *διπλοῦν οἰκίδιον* in Lysias de caede Erecth p. 12), there is" water from the sea "in a wel and in the rock are the signs of the trident, which were said to have appeared as proofs of Poseidon's contest about the possession of the land." These signs are indeed found at the bottom of a well cut in the rock. The well itself is still lined with stucco, and over it stood the hollow altar of the Thyechoos, through which the Butade, or priest of Erechtheus in the dry season, poured water in order to moisten the olive-tree in the inner part of the Pandroseum. For that purpose there is still a subterraneous channel passing from the well under the wall into the soil of the olive-tree in the Pandroseum. Outside of the Stoa is a cistern communicating with the well, and also by a second channel with the Pandroseum. This second channel appears now to be obstructed by masonry.

The olive-tree, no doubt, was named *πάγκυφος* because it stooped under the roof of the Pandroseum and turned its branches towards the windows, which were clearly intended to admit air and dew (*δροσος*) into the room where the olive-tree was growing. There was no reason why there should not be an altar of Zeus herceios over the cistern as in other buildings. The whole Pandroseum, being destined for the olive-tree, it is difficult to justify the supposition that the large and beautifully ornamented door (*τὸ θύρωμα*) in the Erechtheum should be an open entrance into the Pandroseum. If it had been, why did not Pausanias pass through it? All Architectonic difficulties in regard to it vanish, when it was, as I have shown, closed and concealed from the inside of the Pandroseum by large blocks of marble, and outside ornamented with black marble slabs, which are the ones, as I presume, mentioned in the inscription.

The water in the well of the Erechtheum was called mysteriously and enigmatically *θαλάσσιον ὕδωρ*, having its origin from the sea, and afterwards was simply called *θάλασσα*,—as Strabo says: "*διὰ τὴν κρύψιν τὴν μυσικὴν τῶν ἱερῶν, ἢ σημαίνοιεν τὸ θεῖον.* The religion of the Greeks is full of that *κρύψις μυστική*. The well chiefly being filled by rain, and the rain coming with the south wind, the priests told Pausanias that the well of the Erechtheum presented the sound of moving water at the time when the south winds blew *τὸ φρέαρ παρέχεται κυμάτων ἦχον ἐπὶ νότῳ πνεύσαντι.*

There can be no doubt that also the portico of the six virgins, the Korae of the inscription,

* See p. 158, *ante*, for brief notice of it and report of the discussion which followed.

strictly belongs to all the other sacred parts of the whole building. I think they cannot but represent the six daughters of Erechtheus, who, at a time of war, offered themselves for their country, and were said to have been elevated to heaven as Hyades, goddesses of the rain. The flat roof they bear upon their heads is hollowed so as to prevent the rain from flowing off. Perhaps there was somewhere an arrangement to lead the rain into the interior of the portico and thence by a still existing doorway into the cistern of the Cekropion, or to the roots of the olive-tree. DR. FORCHHAMMER.

Kiel, April, 1876.

Remarks on Dr. Forchhammer's Communication.

By Mr. Fergusson.

Dr. Forchhammer's paper is one that I would not have thought it necessary to notice had it appeared independently in any of the ordinary channels of publication, inasmuch as it is not an answer to my article on the subject of the Erechtheum, and, indeed, except a complimentary allusion to my restoration of the Mausoleum, he takes no notice of me or of my restoration, directly or indirectly, during the whole of his observations. In fact, he only uses my paper as affording him an opportunity of re-stating certain views regarding the Erechtheum, which he put forward last year in a work called "Daduchos." That work I had in my possession before I wrote my paper, but the views therein enunciated appeared to me so strangely at variance with the facts of the case as known to me, that I thought the kindest thing I could do was to say nothing about them. As, however, the committee of papers of the Institute think Professor Forchhammer's paper worthy of being placed on record in the same category as mine, it becomes incumbent on me to state why I dissent from his views, though it is not pleasant to be obliged to speak disrespectfully, as I must at least appear to do, of the theories of one who has attained to such eminence among the Greek scholars of the day.

I may, I hope, however, be excused from noticing the mythological views with which the Professor introduces his paper. I said nothing about mythology, and do not profess to understand anything so transcendental as his views on the subject. My observations were confined strictly to the architecture of the building, of which I fancy I am capable of forming an opinion, and hope to be allowed to adhere to this restriction now, as that only seems to be what really concerns us on the present occasion.

The Professor commences his description of the building at the top of the third page, with what purports to be a quotation from Pausanias. How far it deserves to be considered as such any one can see at a glance who will either turn to the original Greek, or be content with the translation, of which I printed every word bearing on the subject (pp. 142–143). The principal discrepancies are, that Pausanias does not use the word "west" which the Professor puts into italics; had he used any such definite indication the controversy would never have arisen. He does mention the altar of "Zeus hypatos," but does not say that it was erected by Cecrops, and he does not mention the "hypogeon of Cecrops," as existing either where the Professor puts it, or indeed anywhere else. He is absolutely silent regarding this tomb. The assumption, therefore, that the "little doorway under the second pillar" led into the "Cecropion," is the Professor's own, and whether right or wrong is not justified by anything in Pausanias.

Leaving these "quotations" for the present. The route which Professor Forchhammer assumed Pausanias to have followed has at least the merit of originality. All other writers, so far as I know, understand him to have left the Parthenon by its eastern door, visited the objects at the eastern end of the Akropolis, and entered the Erechtheum by the eastern door. He, on the contrary, makes him come from the south; he either jumps down the terrace wall that extends 80 ft. or 90 ft. westward from the temple, or turns it, and then passing by the temple itself, he is made to enter what is usually assumed to be the northern portico, by the little doorway at its south-western angle. This portico thus becomes, according to Dr. Forchhammer, the Erechtheum, but in order to fit it for this purpose metal gratings are assumed to have existed between all its columns, so as to inclose it like a gigantic birdcage or wild beast's den. It need not be said that there is not a shadow of written authority for this, and I hold it to be impossible that such grilles or gratings could ever have been so fixed and sustained without mortises or traces of their fastenings being now found either on the floors or the columns; it need not be added that none such have yet been detected either by the Professor or by any one else.*

The most startling part, however, of Dr. Forchhammer's theory of restoration is that the great doorway under this portico,—the *θύρωμα* of the inscription, as he admits,—was not a doorway at all, but a false doorway or sham, and he asserts that he himself has seen the regular blocks of blue marble with which it was originally built up. It may be so, but it is quite certain that no one else has observed these. It is true that Stuart was denied access to this part, as it was then used as a Turkish arsenal, but Lord Elgin and his artists had access to every part of the building. So had Inwood, for he drew this doorway in its minutest detail (his work was published in 1827), and so have hundreds since, yet no one either before or since has seen what Dr. Forchhammer saw, or made any remarks that could justify such an hypothesis.† We may, therefore, I fancy, fairly assume that when the doorway was built up by the Turks, or whoever did it, they selected some of the larger and more regular blocks that lie scattered about the Akropolis in thousands, and did it with more care than other similar blockings up they have indulged in.

The attempt to connect the *θύρωμα* of the inscription with the *θύραι λιθιναι* is no doubt ingenious, but so far as I can judge it will not bear serious examination. The first term is used in the seventy-eighth line of the inscription, without any qualifying epithet which would lead to the assumption that it was anything but a large doo-way, capable at least of opening, which is the only meaning attached to the word in any lexicon I have access to. The expression, "for ever closed," is wholly of Dr. Forchhammer's invention, and is not found in Pausanias nor anywhere else. The *θύραι λίναι* occurs in the 180th line of the inscription, but as that is perfectly consecutive, had there been any connexion between them they would certainly have been mentioned together. Besides this they will not fit; according to the inscription, the slabs were 8 ft. 3 in. high. The doorway is only 15 ft. in the clear, and they are 1 ft. 6 in. too high. They were 2 ft. 6 in. wide, or 5 ft. together, while the doorway measures 6 ft. 6 in., so that in that direction they were 1 ft. 6 in. too narrow.

It would be easy to go on multiplying these verbal and technical objections to Professor Forchhammer's theory to any extent, for there is hardly a line in his description that does not appear to me to contain a misapprehension of some sort, but to my mind the great argument lies in the question, is it conceivable that the Greeks in the age of Pericles could have perpetrated such a sham? In so far as I am capable of realising the arrangement of this building, there is nothing so exquisite either in Greek or in any other art as the proportion of the two pillared porticos of this building to each other, and to the relative importance of the apartments to which they led. Nothing more beautiful, either in design, proportion, or utility, than the great doorway to the position in which it is placed, and nothing more clever in design than the size and position of the smaller doorway relatively to the functions I conceive it was designed to fulfil. To be told now that all this is a sham, which would not be tolerated at Kensal-green, is strange and rather startling, for there is really no analogy between a frontispiece of a tomb engraved on a rock and such a temple building as this. The Professor in his second letter talks of "many examples of these cut by the Greeks." I know some early barbarous ones in Asia, and equally barbarous late examples of the Roman age, but not one in Greece of the great Greek age; but here, as in many other instances, I must bow to his superior knowledge, and if he will produce his examples it will be time enough to discuss their relevancy. Assuming, for the nonce, however, that these examples do exist, though I am ignorant of the fact, the absurdity, in so far as I can judge, lies in the assumption that the Greeks set up a sham doorway in front of what every one in Athens—if the Professor is right—knew to be the tomb of Cecrops, in order that it might simulate the tomb of Erechtheus. In his second letter he admits, in contradiction to the theory of his first, that the sepulchre of Erechtheus was within the Temple; and there I believe he is right, and I have pointed out what I believe to be indubitably the remains of that tomb, but he prefers to contradict himself rather than notice anything I may have pointed out.

There are other difficulties in the Professor's theory as great as these, which it would be easy, though tedious, to dwell upon. Meanwhile I am prepared to take my stand on the broad ground that such contrivances and such shams as he insists upon are in direct opposition, not only to every principle of Greek, but of any true, art, in any part of the world. If he is right, not only I, but every one who has hitherto written on Greek art, is hopelessly wrong; we must all go to school again to learn the first elements of the art.

The truth of the matter appears to be that Professor Forchhammer has been led away by a discovery he fancied he made on the spot, and to which all his ideas of the building have been made to bow. Just inside the western wall of the Temple is a long, low vault, extending the whole width across. It is about 12 ft. wide, and 6 ft. 6 in. high in the centre of the arch, which is constructed of rubble masonry, the stones composing it being not much larger than ordinary bricks. In some parts the arch is single, the stones being a foot or so long. In others it is in two rims, but nowhere is it more than 1 ft. 6 in. in thickness, the stones of which it is composed being only very partially dressed. It is divided into three compartments by two strengthening arches, and no access is obtained to it except by a man-hole in the roof of the centre compartment.

Professor Forchhammer admits, in his present paper, that Thiersch, Raoul Rochette, the members of the Athenian Commission—he might have added Tetaz, Beulé, and, in fact, every one else who has mentioned it—assume it to be a modern Turkish construction. Nine people, in fact, out of ten, who have written on the subject do not mention it at all, it appears to them so manifestly modern; and all those who do mention it, except Forchhammer, distinctly state that it is a Turkish cistern, or granary, or storehouse of some sort. In his "Daduchos" (p. 131), Professor Forchhammer instances the Cloaca Maxima at Rome, as a vault similar to this, but that is composed of three rims of cleanly-dressed and perfectly-fitted stones, aggregating 5 ft. in thickness, and consequently infinitely superior to a rubbishy rubble vault like this, only 1 ft. to 1 ft. 6 in. in thickness; and, consequently, till something more analogous is brought forward, I for one decline to believe that this vault was an integral part of one of the most highly-finished temples of the best age of Greek art. Besides this, as the Professor admits, its extrados rises 1 ft. or more above the floor-line of the temple, as marked by the steps of the north and west doorways, and by the narrow course marking the floor-line all round the interior. When covered by the pavement, which I presume it will be admitted it once was, this discrepancy of the levels would have been been even more marked, and, so far as I can judge, in Greek art impossible.

If what has been said above is sufficient to justify me in rejecting Professor Forchhammer's views on the two cardinal points—of the sham doorway, symbolising the tomb of Erechtheus; and the Turkish vault, being the tomb of Cecrops—it is no use attempting to follow the argument further. If he is right in these, all the assumptions interspersed throughout his essay may be right; but if he is wrong on these two points, his whole theory falls to the ground like a house of cards, and it is no use arguing about what, in that latter case, becomes manifestly untenable.

It may, for instance, be left to botanists to decide whether the olive-tree would grow in a chamber with a solid roof, lighted only by three small windows looking to the west. I fancy it would not; but, at all events, I feel sure that his plan of moistening its roots with salt water would not improve its vigour or health. In like manner it is needless to inquire whether the bitch, who figures so largely in all restorations of the temple, was likely to leap down a clear

* A grille of some sort seems to have existed between the inner pillars of the Posticum of the Parthenon. At least, the mortise-holes by which such a thing could easily be sustained are perfectly distinct at the present day.—See Bötticher Untersuchungen auf der Akropolis, figs. 20 to 26.

† In a second letter to Professor Donaldson he somewhat modifies the expression used in his first statement, but he adheres to the assertion that the masonry he saw was the original filling up of the doorway, and erected when the temple was first built; which is all we are at present concerned with.

drop of 10 ft., which is the only means of communication the Professor provides between the upper and lower temples. I feel sure, at all events, that neither the priests nor votaries were likely to follow her example; and if they did, it is difficult to see how they would ever get back again. But these are details it is hardly worth alluding to, and only to be understood by examining the plates in his "Daduchos."

As Professor Forchhammer nowhere in his paper alludes to my restoration, nor to the arguments by which I sought to sustain it, no defence or re-statement of them is called for, or necessary, at present. My views remain exactly where they where before the Professor's paper was written, with this only difference: the Institute have now before them two separate and independent restorations of the temples of the Erechtheum, and can choose whichever most accords with their interpretation of the authorities, or their views of the principles of Greek art. For myself, I have, I believe, said enough above to justify me in declining to accept the Professor's views as a substitute, or even an improvement in any way on my own; and this seems to be all that is at present required.

In conclusion, I can only say it is now more than thirty years since I first became personally acquainted with the buildings in the Akropolis, at Athens, and during the interval they have seldom been long out of mind; and I have thought much and written a good deal about Greek architectural art. The result has been, that I have arrived at views so diametrically opposed to those of Professor Forchhammer, not only as to the first principles of Greek art, but also as to the mode in which authorities should be interpreted and restoration attempted, that agreement between us seems impossible. I may, of course, be mistaken, and my views be as completely beneath attention as Professor Forchhammer considers them to be; but I decline to admit that this is the case, till at least something more pertinent to the subject is brought forward than anything contained in the paper now under examination.*

TIMBER NOMENCLATURE.

A MERE glance at the vocabulary pertaining to timber shows that it abounds in monosyllables, and that words of a compound character are the exceptions. This fact points with unerring truth to the rude and simple language of our Saxon ancestors as the source from which it is drawn.

Balk, or "baulk," as applied to a log of wood, is from the Saxon *balc*, the German *balken*, and the Dutch *balk*. In the former dialect it had a more extended meaning than it bears at present, as we find it implied a beam, a roof, a covering, or a balcony.

Batten is from the Saxon "bat," a boat or ship, and implies a piece of wood suitable for making or building such vessels. The club or bat of the cricketers, as applied to a piece of wood, is allied to this word.

Beam, from the German "baum," a tree. In the sense of a tree the word still lingers with us in horn-beam, horn-tree. Its primitive meaning was a rough-hewn tree used for constructive purposes.

Board is the Anglo-Saxon "bord," and German "brade," a thin plank. This word has been highly wrought upon, from being made of boards. We find it applied to the deck of a ship, also to a table, and hence those that assemble round it, and even the food placed upon it.

Chestnut, sometimes called Spanish—from the fact of the best fruit coming from that country—is from the Anglo-Saxon "cyst-beam," literally the fruitful tree; being a tree requiring a warmer climate to ripen its fruit than that prevailing in this country, it is naturally inferred that it was a tree little known to our rude ancestors. Be this as it may, the fact remains that they were present at its christening. The horse-chestnut was so called upon its introduction from Asia in 1629, the term being a mere translation of its classic name, *hippocastanum*.

Deal is the Anglo-Saxon "dael," and the German "diele," a part or portion, hence a piece of wood. In early times it most probably referred to a riven piece, as a riving axe was called a "deal axe"; we still retain the word in a "deal of cards," meaning a division or portion of the whole. So far as the timber trade is concerned, the term "deal" appears to have been applied alike to the fir and the spruce, the "mast-tree" and "deal-tree" being common terms long before it was known what trees they were the products of.

Fir, as a term, embraces all the best known coniferous trees, such as the Scotch fir, the spruce fir, and the silver fir; it applies to trees of a resinous character, easily ignitible, and consequently suitable for fuel, for torches, and firebrands. Gerard says, "the fir-tree" was originally the "fire-tree," an inference that all investigations confirm, and there can be no doubt upon comparing the Anglo-Saxon "fyr," fire, with the Scandinavian "fyrre," fir, that the terms "fire-wood" and "fir-wood" are synonymous.

Log is an old Dutch term for "heavy," hence a heavy piece of timber is so called. The equivalent in the German tongue is "klog." In America, where the mother tongue is subject to great mutations, the act of rafting timber has got corrupted to logging.

Lumber, dry, household rubbish, has taken the place of the term "wood" on the American continent. With the early settlers, whose all lay in the cultivation of cereals, timber was an incumbrance to the land; and although it has long since raised itself into a marketable commodity, it has failed to free itself from this term of ridicule.

Oak, the Anglo-Saxon "a'c," "aec," and "aac," and German "Eich." The first form is preserved to us in the fruit "a'corn," the corn of the oak. In ancient times it was a tree prized for its fruit, being used for fattening swine, and, in time of dearth, as human food.

Spruce occurs as spruce fir and Norway spruce. The former is the older or original term, and if rightly read is simply descriptive. Spruce fir is the old Prusse, or Prussian-fir. It occurs in the manuscript of *Liber Albus* (*circa* 1250), as "pruz-fir." It would appear that there was little or no distinction in these early times between Prussia and Russia, as the Russian leather of our day was the spruce leather of the Dutch merchants, who, during the Hanseatic League, had their seat of trade at Wisby, in the Baltic. It was through their instrumentality that the produce of the Baltic shores reached England *vid* Amsterdam, and from this cause may be traced the numerous lowland terms that abound in our nomenclature of timber. It will be seen that as the timber trade moved to Norway, the term spruce accompanied it, and hence "Norway spruce fir" has long been held as the equivalent of "white deal." The same remark applies to America, where "spruce" stands for the "white fir" of that continent. In unearthing the meaning of these ancient terms, the first form in which they were used contrasts strangely with their present use. In the case in point, we should scarcely be credited with the exercise of sound reason were we to write "American Prussian fir" for "American spruce fir," although such term would be orthographically correct.*

* Some other communications on the subject appear in the Transactions of the Institute.

THE NEW WINTER GARDEN AND AQUARIUM AT RHYL.

THE watering-places in the north are fast vieing with those on the south, and on the west and east coasts, in becoming specially attractive from the number of inducements to visitors and novelties which they are constantly presenting. Southport, from an unpretending village, not very many years ago, has been transformed into a noble and beautiful marine town, and is now designated the Montpelier of England, whilst its neighbour, Blackpool, on the north-west coast, is not inaptly called the Brighton of Lancashire. Those who, like the writer, may remember Rhyl little beyond a decade, with its then almost solitary street frontage facing the Welsh coast, could scarcely have imagined that it would now be distinguished as the Queen of North Wales watering-places, but so it is that within the last few years Rhyl has made rapid strides, both in regard to its expansion and the number of its public buildings, and other places of resort, and the particulars of the opening of a new skating-rink, and laying the memorial-stones of an aquarium and winter-garden, which took place on Saturday last, are deserving of special record.

Manchester and Liverpool have largely contributed to the success of some of the northern watering-places of which we are speaking,—notably so in the case of Southport, and it is to a Manchester company of capitalists that Rhyl is indebted for the aquarium and winter gardens which it will shortly possess, and for the skating-rink which was inaugurated on Saturday last. It is little more than twelve months since the company was established, and immediately afterwards they purchased about 35 acres of freehold land, one third of which is being devoted to the purpose of winter gardens, with aquarium, concert-rooms, skating-rink, &c., whilst the remainder of the ground is intended to be sold for the erection of residences and hotels. This land has already been in great demand, in proof of which it may be stated that up to the present time the company has realised a profit of 2,500*l.* for portions of it. The main erections of the structure, the memorial stones of which were laid on Saturday, will be the aquarium, winter gardens, and concert-hall. The aquarium will contain a show space of 675 lineal feet, the largest sea-water tank being 90 ft. long, and the largest fresh-water tank 50 ft. The seal-pond will be supplied with the water of every tide. The winter garden will be 150 ft. long by 75 ft. wide, and the concert-room will be about the same dimensions, which, with the galleries, will afford space for a very large audience. There will be also a refreshment-room and dining-hall, each capable of accommodating a thousand people; likewise a sculpture gallery, 150 ft. by 40 ft. Between these erections and the sea a large stretch of ground will be laid out as bowling-greens, Italian gardens, and playing fountains, whilst the land dividing the aquarium from the skating-rink will contain ferneries, terraces, a lake, a waterfall nearly 30 ft. in height, broken in three places by ledges of rock; and a cave 70 ft. long, 30 ft. wide, and 18 ft. high; together with rustic bridges and grottoes. The four memorial stones were laid respectively by Mr. J. E. Middlehurst, of Manchester, chairman of the company; Mr. Ellis Eyton, M.P., one of the directors; Sir Piers Mostyn, and Mr. Osborne Morgan, M.P. The skating-rink, which was inaugurated on the same day, is a very large one, being 180 ft. long, and 66 ft. wide, with superficial skating area of 1,113 square yards. It is covered in with a semicircular open-timbered roof, rising to a height of 40 ft. from the floor.

It is noteworthy that the whole of the bricks with which mainly the several buildings are being constructed are manufactured by the company on land purchased by them adjoining the railway. This ground yields excellent clay, and the machinery and plant brought into use enable the directors to turn out from 70,000 to 90,000 bricks per week, at a saving of from 10*s.* to 14*s.* per 1,000.

The estimated cost of the several buildings is 35,000*l.* Mr. Owen Edwards, of Manchester, is the architect; and Mr. Herd, of Manchester, and Mr. Abel Jones, of Rhyl, are the contractors.*

* Condensed from the *Timber Trades Journal*.

* In a previous volume (xxxii., p. 1,072) a view of the Town-hall, recently erected in Rhyl, will be found.

THE RADIOMETER.

IN a recent discussion by the Paris Academy of Sciences on the cause of the movements in Prof. Crooke's radiometer, M. Govi rejected the idea of an impulsive force of light and of thermal currents of gas in the receiver; the cause he assigned was the dilatation by heat, or condensation by cold, of gaseous layers which all bodies retain at their surface, even in an absolute vacuum. It should be possible to obtain insensible radiometers, by heating the vanes during the action of the mercury pump. M. Fizeau said that the constant motion for as long as an hour of a radiometer placed in the centre of a circle of candles was against this hypothesis.

The future of the radiometer is being talked of, though its *rationale* is certainly as yet unsettled. The inventor says,—Having found that the force developed would carry round a comparatively heavy weight, another useful application suggested itself. If I can carry round heavy mirrors or plates of copper, I can carry round a magnet. Here, then, is an instrument carrying a magnet, and outside is a smaller magnet, delicately balanced in a vertical position, having the south pole at the top, and the north pole at the bottom. As the inside magnet comes round, the outside magnet, being delicately suspended on its centre, bows backward and forwards, and, making contact at the bottom, carries an electric current from a battery to a Morse instrument. A ribbon of paper is drawn through the "Morse" by clockwork, and at each contact—at each revolution of the radiometer—

a record is printed on the strip of paper by dots; close together if the radiometer revolves quickly, farther apart if it goes slower.

THE ACADEMY OF MUSIC, MELBOURNE.

AMONGST the most important works just now in progress in Melbourne are the new Arcade and the Academy of Music. Commenced only twelve weeks since, it has risen by perceptible stages daily, and as it is to be formally opened on the 1st of November next, it will, when finished, stand as a monument of the architects' genius. Over one million and a half of bricks have been already used in the edifice, which is rapidly approaching completion. The Bourke-street or grand façade will be one of the most striking frontages in the city, the addition of several statues being quite an original feature in Melbourne. The arcade will consist of thirty-four shops. The front premises have been constructed to serve the purpose of an hotel and *café* on a large scale. A jeweller's shop will occupy part of the frontage on the opposite side of Mr. Hosie's establishment, the remaining portion being taken up by the grand staircase which leads to the dress circle of the Academy of Music. The academy occupies one of the block, and the back of the stage runs up to Little Collins-street. After ascending the stone staircase, visitors will find themselves in the grand saloon, a lofty apartment, 130 ft. in length, which runs over one side of the arcade. Twelve bronze statues, 5 ft. high, on 4 ft. pedestals, support rich lamps, while the intervening space round the walls is filled up by mirrors over 11 ft. high. Between these glittering accessories will be placed specimens of the highest photographic art to be obtained. Ranged around the walls of this saloon will be crimson satin folding chairs, statuesque vases, and groups of rare exotic flowers. At either extremity of the saloon two mirrors, 12 ft. high and 7 ft. wide, will reflect back the figures of the promenaders from one end to the other. One of the most striking features of the whole design, however, will be an immense stained-glass screen, forming the end view from the arcade. This screen, divided into nine panels, has for the centre a colossal figure of her Majesty the Queen, 11 ft. high, by Messrs. Ferguson & Urie, of this city. Eight smaller panels—four on each side, will show allegorical pictures of music and the drama, while eight large circles will be filled in with life-size busts of the most eminent musical and dramatic composers and authors—all done in stained glass. Instead of the disagreeable cramped-up boxes that usually do duty for ladies' cloak-rooms in this city, Mr. Aarons has launched into a heavy expense to secure full accommodation. A cloak-room, 40 ft. long by 16 ft. wide, is provided for the ladies, besides lavatories, dressing-rooms, &c., all well fitted up, and supplied with fire-places and stoves. The gentlemen are similarly provided for, and as Mr. Hosie intends making some novel arrangements, very pleasant parties may make the Academy their rendezvous, where they can have dinner, dress for the theatre, and attend it without having to leave the building once. The theatre itself will be on a scale of magnificence hitherto undreamt of in this part of the world. There will be no pit, the only space below the level of the stage being occupied by the stalls. This part of the house has been constructed with the view of holding 250 chairs, the frames of which are of cast iron, light and pretty in pattern, and coloured grey and gold, with turn-up seats of maroon Utrecht velvet, and backs and arms to match. The dress circle, which rises level with the stage, will hold 300,—that is to say, it will comfortably accommodate that number. Special attention is to be bestowed on the vice-regal box in order to make it worthy of the general surroundings. The family circle occupies the place usually allotted to the dress circle, being only 10 ft. above the level of the stage. This part of the house will accommodate 500, while the gallery above will seat 800 more. This latter part of the house will be open to the public at the prices charged at other theatres for the pit. The whole of the decorations will be on the same liberal scale.

In order to guard against the danger of a conflagration, Mr. Aarons has adopted an ingenious, and, so far as this colony is concerned, novel invention for extinguishing fires without human aid, or rather of making a fire extinguish itself. It is on the same principle as an invention by Mr. Stewart Harrison, which consists of placing a 4-in. pipe of wrought iron throughout the building, extending from the bottom to the top, and carrying 2-in. pipes of similar material from this pipe along the ceiling of each room or part of the edifice, at distances of about 6 ft. apart, or more if desired. At the same distances along the pipes, dividing the whole area of the room into squares of 6 ft., or 36 ft. superficial, are placed valves connected with the pipe, and fastened by fusible metal solder, which keep the water shut off until the metal is melted. The pipes being charged and the valves shut, all remains so until a fire breaks out, when the flame or products of combustion rising to the ceiling, as all hot or heated air will do, heats one or other of the valves exposed to the greatest heat, and the small brass ring at the bottom of the boxwood stem of the valve having attained a temperature of 212 deg. or thereabouts, which is that of boiling water, the heat of the flame causes the wedge of fusible metal, which keeps the inner or smaller plug sustaining the valve against the pressure of the water in place, to melt, and the small plug instantly drops, being forced out by the water. The valve being thus opened, the water pours directly on the burning material beneath, and keeps on doing so until it is shut off by those in charge, extinguishing, it is expected, any active or incipient fire in its immediate neighbourhood, and rendering its extension impossible. The rose-like form of the valve distributes the water just as the rose of a garden-engine or a watering-pot, in a stronger or lighter shower, according to the size of the perforations, cooling down all that is heated or beginning to fire, and quickly putting out that already ignited. Mr. Aarons has entered into the design along with Messrs. Reed & Barnes, the architects, *con amore*. The contractors are Messrs. Freeman & Lockington.

A PATENT ROADWAY IN SHEFFIELD.

SOME experiments have been tried on a patent roadway laid on the premises of the Saville-street Foundry Engineering Co. by Messrs. Davison, Walker, & Hainge. The experiments were made in a small space inside the works, where about 100 square yards of the patent roadway had been laid. The "iron-roughed asphalte paving," as it is called, is laid on a bed of rough concrete in cement about 9 in. thick, above which is placed a layer of fine concrete or asphalte about 1 in. thick, and then come a series of iron plates or frames, having projecting iron studs at intervals, the spaces between the studs being filled in with asphalte, so as to produce a paving of asphalte, with slightly projecting bearing surfaces, adapted to sustain heavy traffic, and to give foothold to horses. That the pavement, by reason of the slightly projecting iron studs, is capable of giving very sure foothold to horses, was apparent. One of the workmen appeared on horseback, and took the animal over the new pavement at the trot, pulling it up very sharply at intervals, yet the horse never slipped, being able to keep firmly on its feet throughout the whole of the experiment. A horse and gig were now taken over the roadway, with equally successful results, and then a huge dray, bearing a weight of nearly three tons, and drawn by three horses, was taken across the pavement. The horses, even in backing, retained a firm foothold; but in some parts of the roadway the weight caused the asphalte to spring a little. The iron plates upon which the asphalte is filled can be lifted in sections of four to the square yard, and thus any alterations to the thoroughfare can be carried on with despatch, and without any obstruction to the traffic.

NEW BUILDINGS AT THE NEWINGTON WORKHOUSE.

EXTENSIVE additional buildings are in course of erection at the Newington Workhouse, Walworth. They consist of new infirmary wards, board-room, medical officer's house, receiving-wards, a mortuary, porter's lodge, and other additions so as to give increased accommodation to the establishment generally. The foundation-stone of the new buildings was recently laid by the chairman of the St. Saviour's Union, in the presence of the guardians and others interested. The intended buildings embrace new wings to the main central building for the purpose of enlarging the infirmary accommodation. They will be uniform in architectural design and appearance with the present structure, the materials being white brick, with stone dressings. They will be four stories in height, the upper floors containing the wards, which will be 120 ft. long, and 44 ft. wide. On either side of the entrance there will be stone staircases, about 6 ft. in width, leading to the several floors, whilst near the centre of the entrance there will be a lift for conveying bed-ridden patients into the wards above. On each story, at one end of the several wards, there will be spacious day-rooms, together with attendants' rooms, whilst each floor will have a bath-room attached. The lower portion of the building will be set apart for stores.

The additions to the central portion of the present building consist, amongst other structures, of new and more spacious wards for the inmates, four large day-rooms being about to be erected on the ground-floor. A new master's and clerk's office, medical superintendent's office, and strong room, will likewise be erected near the central entrance, whilst on the site of some cottages which formerly stood in front of the building, and recently demolished, will be the board-room, connected with which are both large and small waiting-rooms. On a portion of this site, immediately adjoining the board-room are the medical superintendent's house, and also receiving-wards. The board-room will have its principal frontage to Westmoreland-road, whilst the medical superintendent's house will overlook the ornamental grounds in front of the main building. The two receiving-wards will be fitted with bath-rooms, lavatories, and store-rooms.

In erecting the new mortuary with *post-mortem* room, its entire isolation from the rest of the buildings has been secured. It stands at some distance from them, and the walls of both the mortuary and *post-mortem* room are lined with white glazed tiles, and the floors are laid with asphalte.

Messrs. Henry Jarvis & Son, of Trinity-square, Southwark, are the architects for the several buildings, and Mr. W. Downs, of Walworth, is the contractor. The estimated cost of the buildings is 18,769*l*.

KIRKCALDY FINE ART ASSOCIATION.

THE fifth annual Exhibition of this Association was opened a few days ago, and promises to be what its predecessors have never been, viz., a great commercial success. The Association was established in 1872, and although the amount of sales, &c., has always been on the increase, yet the expense in connexion with the Exhibitions has always been in excess of the earnings. This year, however, the committee were fortunate enough to secure a much better Exhibition Gallery than they have hitherto been able to get. The new room is about 100 ft. long, is lighted from the roof, and has many of the requirements of a picture-gallery, which were totally wanting in the Town-hall. The collection this year consists of about 460 works in oil and water-colours, besides a few pieces of sculpture. Among these (besides a few fine pictures kindly lent, chief of which is a splendid Raeburn) are many capital specimens of such well-known artists as Waller H. Paton, Wm. Fettes Douglas, J. B. McDonald, Erskine Nicol, J. C. Wintour, Wm. Beattie Brown, Wm. F. Vallance, G. P. Chalmers, John Smart, Gourlay Steel, W. E. Lockhart, A. Perigal, Clark Stanton, C. Lees, James Cassie, and a host of others, which, altogether, make up a most creditable exhibition for such a place as this plucky little town. Local artists too, are well represented, and show that they have not been idle since last year. Should the Association receive the encouragement they certainly deserve, there should be little difficulty in the way of building a suitable gallery for themselves. The gallery will remain open for a few weeks, and during that time there will be occasional performances of music by friends of the Association, which, it is hoped, will make the Exhibition more popular among the working classes, and tend to the advancement of the Association in the way of increased membership. The number of members on the list last year was about 200, but this has been increased to about 300 already this season.

CHURCH ARCHITECTURE.

CAN any of your readers inform me what was the use of eight square holes, constructed at the time an "Early English" church was built, intentionally? They are in the walls of the chancel, some concealed by the pewing; they go quite through the wall: two in the east wall, three on each of the other walls, at regular intervals, and carefully tooled out; size, 5 in. or 6 in.

MOONRAKER.

BELLS FOR ST. PAUL'S.

AT the last meeting of the Court of Common Council it was resolved, on the motion of Mr. J. T. Bedford, to subscribe the sum of 530*l*., the estimated cost of the principal, or tenor bell, of the peal it is proposed to set up in the bell-tower of St. Paul's Cathedral. Some opposition was offered, but the motion was ultimately carried by a large majority.

A memorial from the committee of the fund stated that two bells had been given by the Drapers' Company, and one each, at large cost, by the Grocers', Clothworkers', Fishmongers', Merchant Taylors', and Salters' Companies; and besides the tenor bell, only four smaller ones, costing less than 400*l*., remain to be contributed. The expense of the whole peal would be about 3,800*l*., exclusive of hanging, machinery, and ringing, which would cost nearly 500*l*. more.

THE HULL HYDRAULIC POWER COMPANY.

THE works for supplying hydraulic power to Hull, now completed, are attracting attention from their being the first of the kind carried out under Act of Parliament.

In the year 1872 an Act of Parliament was obtained for the purpose of establishing at Kingston-upon-Hull what was termed in the preamble of the Act, "a system for applying motive power by hydraulic pressure to water-side and land cranes, used for the purpose of raising and landing goods, and for working dock gates and other machinery." It also authorised the abstraction from the Old Harbour of the river Hull, an amount of water not exceeding a million gallons a-day for distribution within the company's district, for which a payment was to be made to the Corporation of 12*l*. 10*s*. per annum for each quarter of a million gallons, the water to be used for no other purpose than as a motive power, except with the consent of the Corporation. A 6-in. pressure main has been laid from the northern boundary of the defined area, near the Cottingham drain; in a southerly direction along Wincolmlee, Trippett, Dock Office-row, under the Old Dock Basin (which forms the eastern, or River Hull entrance to the Queen's Dock), and crossing this entrance it is laid along the whole length of High-street, terminating close to the western approach of the South Bridge across the River Hull. The length of pressure main laid, exclusive of the dock crossing, is altogether 1,485 yards, that on the north side of the dock entrance being 673 yards in length, and that on the south side 812 yards. In laying this main many obstructions were met with, in the shape of old sewers, gas and water pipes, gullies, &c., all of which had to be avoided. This involved much careful arrangement of bends and irregular pipes, and the difficulties were increased, as the streets through which the works were carried out had a heavy goods traffic over them, and in many parts, especially in High-street, were very narrow. An engine-house has been built to receive, eventually, four 60-horse power engines. As the ground beneath this site was silty and treacherous, the foundations had to be carried down 24 ft. before a good bottom was reached on hard clay. The footings of the walls are built on a series of arches carried on concrete piers, which made sound and economical work. The engine-house is covered by a cast-iron tank. Two pairs of 60-horse power, high pressure, horizontal pumping-engines have been erected, capable of pumping about 300 gallons per minute at 700 lb. pressure per square inch, with steam at 100 lb. pressure, supplied by two Lancashire boilers, fitted with the most approved appliances. The water-supply from the river Hull is filtered. One accumulator is erected at the pumping-station in Machell-street. It has a diameter of 18 in., and a stroke of 20 ft. The case is loaded with 65 tons of slag and sand, which gives a pressure of 600 lb. per inch in the main. The accumulator case and cylinder rest on concrete piers carried down to the solid clay, and are enclosed in a brick tower. The supply of water is obtained from the river Hull, and is pumped through a 10-in. suction-pipe into the tank over the engine-house. The distance from the river to the pumping site is 125 yds., and the total height of the lift from low-tide level to top of tank is 35 ft. A centrifugal pump (in duplicate), fixed in the engine-house, raises the water from the river to the tank. The water-power supplied by the company will be paid for by the consumer at rates dependent on the amount of water used. The following tariff has been issued by the company:—One crane in one warehouse, 52*l*. per annum; two cranes in one warehouse, 94*l*. per annum; three cranes in one warehouse, 132*l*. per annum; and four cranes in one warehouse, 166*l*. per annum. Each crane will have a counter attached to it to register the amount of work done. One hundred tons may be lifted 40 ft., or 200 tons 20 ft., and so on, each day by each crane, for the above charge, which is under one halfpenny per ton for a lift of 40 ft. If more work than this is done, the extra work will be charged at the rate of 4*s*. for every additional 100 tons lifted 40 ft. Special rates will be made for working presses, hydraulic engines, capstans, small cranes, &c., as occasion arises.

The works have been carried out by Mr. Henry Robinson, C.E., the company's engineer, assisted by Mr. Frederick W. Thornton, the resident engineer. The machinery was supplied by the Hydraulic Engineering Company, of Chester. Already the Dock Company have made arrangements for taking a 4-in. pipe from the Hydraulic Company's main for the purpose of working cranes and appliances at the Queen's Dock, and several parties in High-street are preparing to take the power. This is the first work of the kind which has been carried out on the co-operative principle in the country.

THE THEATRE ROYAL, BIRMINGHAM.

THE Theatre Royal Birmingham was reopened on the 7th inst., after alterations and redecoration. We learn from *Aris's Gazette* that the theatre was originally opened to the public in January, 1775, under the management of Mr. Yates, the then manager of Covent Garden Theatre, London. Seventeen years afterwards, in 1792, the building was burnt out, only the outer walls being left standing. In 1795 the theatre was reopened, Mr. Macready assuming the management. On January 6th, 1820, the theatre was again destroyed by fire. The work of reconstruction was at once begun, and on August 14th of the same year the "Royal" was opened, under the management of Mr. Alfred Bunn. From that time to the present the theatre has had an uninterrupted career of success and good luck. During this lengthened period it has undergone but few alterations. The rapid increase of the town of late years has made it necessary that more accommodation should be provided, and this has been done. The pit has been lowered to the depth of 4 ft., and carried under the lower circle. By this means additional accommodation will be provided for between 500 and 600 persons in that part of the house. The stage has been lowered in a corresponding degree, in order to suit the gradual slope of the pit. The work of sinking the stage, considering the large quantity of apparatus contained below and resting upon it, was a work of some magnitude; but, by means of a large number of screw-jacks, the whole was removed bodily. The stage-front has been thrown back about 2 ft. The footlights have been let into the boards. The lower circle rests upon stout iron pillars and girders, supplied by Messrs. Bennett & Co., of the Spon-lane Ironworks, West Bromwich. The front of the lower circle has been brought forward about 18 in., enabling the spaces between the rows of seats to be increased. The entrances to the pit have been considerably enlarged and improved. By the lowering of the floor the necessity for ascending steps has been done away with. On occasions when the house was crowded, which of late has not been very seldom, persons standing near the steps at the back or the sides were in imminent danger of an uncomfortable precipitation. That danger is now obviated by the entrance. The old refreshment-room of the lower circle has been transformed into a ladies' cloak-room, and a few yards further on a spacious refreshment-room has been erected, leading out of which is a lavatory. A similar improvement has been effected in the upper circle. The ventilation and heating of the theatre have not been overlooked. Air is brought under the floor of the pit in passages, draughts being prevented by the carrying of it above the heads of the audience. The architect is Mr. Naden, of Temple-street; and the builder, Mr. Moffatt, of Camp-hill.

The theatre has been re-furnished, re-painted, and to a certain extent re-decorated, this portion of the work having been entrusted to Messrs. Smith & Co., of London. Messrs. White & Co., of Great Marylebone-street, London, have supplied a new design in *papier mâché* for the front of the lower circle, which has been painted and gilded. The proscenium has been partially re-painted, and the decorated parts of the house affected by the alterations have been cleaned and "touched up." The lower circle is entirely re-furnished. Mr. John Gault, the scenic artist of the theatre, has painted a new act-drop, containing a view of Stratford-on-Avon Church.

NEW BANKING PREMISES.

Elgin.—The Royal Bank of Scotland are about to erect new banking premises on the site recently acquired by them at Dufftown. The plans have been prepared by Messrs. Peddie & Kinnear, architects, Edinburgh. The architectural design is of the Anglo-Italian order; and the front will measure about 54 ft.; breadth of the main building,—exclusive of a wing to be erected at the back in connexion with the agent's residence,—about 48 ft.; and the height, from the pavement to the top of the roof, which is at present intended to be truncated, having no gables, will also be about 48 ft. In the centre will be the entrance to the bank, on the left or west side of which will be the telling-room, 28 ft. by 19 ft., and 14 ft. 6 in. high. On the right of the entrance will be the agent's room, 19 ft. by about 12 ft. 6 in. At the eastern extremity of the building is the entrance lobby to the agent's private dwelling. Messrs. Forsyth & Stewart, solicitors, who, along with ex-Provost Russell, are joint-agents of the bank, propose to erect offices for their law business immediately to the east of the new building. The architects for the law offices are Messrs. Reid & Melvin.

Ironbridge.—Messrs. Lloyd & Co. have opened their new premises at Ironbridge. The buildings, which are situate in the Market-square, were adapted to their present use from designs prepared by Mr. J. A. Chatwin, architect, Birmingham, and include the bank and a residence for the manager. The premises are four stories high, with an ornamented front of moulded cement with rusticated quoins. The ground-floor consists of the banking-room, 16 ft. high; consulting-room, lavatory, and fireproof strong-room, fitted with Messrs. Chubb's patent iron door. The residence is approached from the Market-square. The contract was entrusted to Messrs. Nevett Brothers, and carried out in their usual style of workmanship.

Brighouse.—The new building erected by the Halifax Commercial Bank to serve the purposes of a branch has been completed. The Classic style has been adopted. In the three stories are combined the necessary offices for a bank, and a manager's residence.

"MAY DIFFERENCE OF OPINION NEVER ALTER FRIENDSHIP."

A CASE of arbitration, in which many of the architects and builders of the North of England have been examined for and against, has recently been decided.

The plaintiff is Mr. Crawford Marley, an extensive coal agent of Darlington; and the defendant, Mr. Thomas Watson, is a respectable builder of the same town.

The action was first commenced at the Leeds Summer Assizes; but Mr. Justice Lush, being scared at the formidable array of architects and professional gentlemen who were to be examined, shelved the trial by referring the cause to Mr. John Edge, barrister, as arbitrator, and on and off has the trial proceeded up to last week.

The whole case can, however, be more summarily disposed of in print by stating that the plaintiff sought to recover 300*l*. damages for injuries alleged to have been done to his house through the building operations of the defendant whilst erecting another house adjoining to the plaintiff's. The damage alleged to have been done consisted of several cracks and flaws occasioned in the west gable and south front wall of the house, as well as fractures internally.

In support of the allegation the following witnesses were called:—Messrs. Oliver (Newcastle), W. Bell, R. B. Dixon, architects; M. Mackenzie and John Robinson, builders; T. Watson, auctioneer, and W. Mosnom, painter. One of these witnesses went to the extent of saying the depreciation in the value of the house was from 500*l*. to 600*l*.

The answer to the case was, that no injury had arisen from the defendant's building operations, and that the cracks and other injuries complained of were in existence four years ago, whilst defendant only commenced his building operations at the commencement of this year.

In support of defendant's view, the following witnesses gave evidence:—Messrs. George Wood, chief assistant to Sir Gilbert Scott; R. Lamb and G. G. Hoskins, architects; G. Dickenson, civil engineer; R. Robson and G. Duck, builders.

The Arbitrator found for the defendant on every point, that no injury had been done by the defendant to plaintiff's house, and ordered the plaintiff to bear not only his own costs but those of the defendant, and the entire cost of the arbitrator and his award.

WHITE LEAD AND ZINC WHITE.

REFERRING to Mr. Redgrave's report on the manufacture of white lead, Professor Barff says he wishes, as having been long engaged on the investigation of paints, to call attention to the fact that the evil which he complains of extends far beyond the manufacture of this substance. House-painters suffer very much from lead poisoning, in its various degrees of intensity; and it is almost impossible to make them see the need of cleanliness and of taking other very necessary precautions. Sooner or later white lead must be given up as a pigment; from its power of saponifying with oil, involving the loss of carbonic acid, it loses its opacity and turns yellowish. It is valued for what is termed its "body," and from the ease with which it is laid on. In his lectures for several years past at the Royal Academy of Arts, he has pointed out its defects with, he is glad to say, some success, and many artists are now using zinc white, which retains its opacity and does not blacken on exposure to foul air. For artistic purposes zinc white can be prepared nearly equal in body to white lead. He feels convinced, from the result of his experiments, that sulphide of zinc, properly prepared, can be made to have as good covering properties as white lead, and that the addition of magnesia in the manufacture renders it as agreeable to work. He wishes, therefore, to call the attention of those interested in this question to the fact that they can obtain a better paint in all respects than white lead, and one which has no injurious effects on the health of those who prepare or use it.

AMERICAN AND ENGLISH MACHINE SHOPS.*

IN every grade of workshop in England, and especially in the engineers' shops (as the machine shops are there denominated), as well as in the offices of the civil engineers, student apprentices or articled pupils are employed. With regard to the former of these, there are many reasons why a similar practice has not been and will not be followed in America. The first of these reasons is the comparative absence in England of that destructive rivalry in mechanical business which exists in America. The rates for labour, and the estimated value of the mineral in that country, have been so low, and the application of machinery so much in advance (at least until recent years of the century) that England has led the world for a market. The established product of an English workshop has at all times possessed what might be called a good will. Few of them will purposely rival, in the same way, another in the production of what is the regular manufacture of the one, and but the exceptional demand upon the other; and purchasers are yet more chary in the acceptance of work from inexperienced makers. A man can be generous who has an abundance; he can be just, where he is sure of just dealing in return. Perhaps the condition of abundance has more relevance to the subject under discussion than that of justice. Not many American manufacturers would accept educated, clear-headed, intelligent young men as student apprentices, to learn from their workmen, their machines, and their processes, the art and mystery of their business. Besides this, the condition of the student apprentices amongst the workmen in one of our shops may be regarded as too anomalous to the habits of the average American workman or foreman, to be supposable in actuality. The second method for obtaining practical experience, — that of the articled pupil,—suffices in the office of the engineer, but is far from satisfactory as the method to learn the value of the workshop manipulations to the pupil. In this country, at this time, there are no articled pupils, and even students in engineers' offices are rarely to be found.

Neither a return to the system of apprentices and masters, nor the adoption of the method of pupilage in an office, presents the least prospect of affording the education of the business engineer in the future.

SLATES.

SIR,—I should be glad if any of your correspondents would furnish particulars of the slates said to be obtained from America and sent to Lowestoft. In the present scarcity and dearness of our own supply, I have no doubt it would interest a great many besides R. W.

* From a paper in the *Journal of the Franklin Institute*.

LYME REGIS, DORSET.

SIR,—Your correspondents do not seem to agree as to the cause of the "fearful state" of Lyme. I am glad to find, from Mr. Hawkins's letter, that want of drainage and overcrowding have nothing to do with it.

I do not quite gather from his letter what noxious gases are generated on the foreshore; nor do I exactly understand what is decomposed,—whether it is the shales or the sea.

That "annual holocaust of really poisoned victims" seems calculated to harrow up the souls of your readers even more than the Bulgarian atrocities. During the twelve years that I have resided here no labourers have been killed, or seriously injured, under the cliffs; nor have I ever seen a case of illness that was attributable to the noxious gases generated on the foreshore.

D. S. SKINNER.

WHAT REGULATES THE PRICE OF BRICKS?

SIR,—The builders tell me that bricks have recently gone up 2s. a thousand, and that stocks are now 40s. delivered, and this after the wonderful brick season we have had, and full warning brickmakers must have had of the demand for bricks.

I dare say you want no suggestions of subjects of inquiry for the *Builder*; but if you do, it would be an interesting inquiry, how far School Boards have affected the value of bricks; whether a reduction in price would follow a larger introduction of machinery in their manufacture, and what difficulties there are in the way of this introduction; and what the future price of bricks is likely to be.

It is curious how closely a community hangs together, and how impossible it is to make changes affecting one part of it, without those changes being felt all through in many ways beyond the simple payment of rates.

HORACE FIELD.

*** We shall be glad to hear what some of our correspondents have to say on this serious subject.

THE WARMING AND VENTILATING OF CHURCHES.

THIS is, in one respect, undoubtedly the most trying season of the year,—not for weakly people alone, but for ordinary and even robust mortals, who are not proof against "catching cold" and the divers afflictions which in natural sequence frequently follow,—in so far as by present structural arrangements it is impossible to regulate the temperature of churches, &c., where large numbers of people are assembled; and chiefly and naturally this difficulty is increased in the now chilly evenings. While the internal atmosphere is rising in temperature, the external is falling; hence the inflow of the cooling and denser air into the midst of the heating and rarifying atmosphere of necessity causes a strong and dangerous current of cold air to descend, in some particular parts of the building, on heated, and so, susceptible, persons. Is it *quite* beyond the grasp of our architects to master this difficulty? In one of the churches of Torquay, being placed for some time near the cold limestone wall at the west end, which reaches up to the lofty roof, the downpour of cold air was so great that I moved my place, while others left the church, the strength of the current increasing as the service proceeded, and the atmosphere of the crowded church becoming continually more heated, forced the air into more rapid motion, naturally driving the expanded and lightened—because heated—air up to the roof, where, finding no escape, and becoming cooled by contact with the cool roof, it necessarily descended by the cold walls,—the circulation thus set up being precisely that which takes place in boiling water in a vessel where the heat is applied beneath the centre only, as when a spirit-lamp is used, the water as it becomes heated ascending in the centre of the vessel and descending against the cooler sides. Is it impossible to contrive means to arrest these air currents? In a second church in the town, columns of cold air are let down from the clear-story windows on the devoted head of some unfortunate who is seated immediately beneath them, and to my cost I have found that through a heated, and therefore rarified, air, a column of cold, and therefore condensed, air will fall, with considerable force and weight. Last evening I had the misfortune to be placed within the arc which was formed by the horizontal projection of a stream of cold and heavy air from the window of a side aisle, on its passage to the floor.

These churches are the work of some of our leading architects, and yet, by these defects, are rendered not only unsuited to the purpose for which they were erected, but absolutely unsafe. And I cannot but think that a little study of the laws which govern these currents of air would lead to a remedy. Surely the present state of our churches and places of public assembly in this respect is a blot on the practice of scientific architecture.

Mr. George Hudson, of the potteries at Poole, has succeeded in the erection of his own house in securing ventilation, while avoiding rapid currents of air in any one apartment to a very remarkable extent; but I am not architect sufficient to see how his system, which he recently was so good as to explain to me, could well be adapted in the cases I have cited.

J. D. P.

CHURCH-BUILDING NEWS.

Kirkwall.—The new Episcopal Church of St. Olaf, Kirkwall, was opened on the 5th ult. It is the only Episcopal Church in the county of Orkney, and has cost about 1,200*l*. It is 71 ft. 6 in. long, and 27 ft. 6 in. broad, and is seated for about 160 persons. It is intended to build a tower 60 ft. high over the main entrance. The materials used in building were random rubble, all the faces being of freestone. The roof is an open one, of Swedish pine, the main beams taking the form of arches. The choir is raised three steps from the nave, the sanctuary three steps more, besides the footpace on which the altar stands. Four stained-glass windows have been already put in. One of these represents St. Olaf, king of Norway, to whom the church is dedicated. He, it is said, was the first who introduced Christianity into the Orkney Isles, and founded the Bishop's See. To the church are annexed a vestry and organ-chamber. In the sanctuary is placed the ancient credence from the old pre-Reformation church of St. Olaf, formerly standing near the shore of Kirkwall. In the vestry is the aumbry from the same church. The bowl of the font is said to be of great antiquity, and was presented by Col. Burroughs, of Rousay and Veira.

Willington.—The new church of St. Mary, at Willington, on the Tyne, has been consecrated. The building has been erected from the designs of Messrs. Johnston & Austin, architects, Newcastle, by Messrs. Robson, North Shields, and consists of a nave and chancel, porch, vestry, and organ-chamber. Sittings are provided for about 300 persons. The cost was about 2,700*l*.

Eckington. — Plans for the restoration of Eckington Parish Church, Derbyshire, have been prepared by Messrs. Flockton & Abbot.

Wickford —The parish church of Wickford, Essex, is now in course of restoration amounting almost to complete rebuilding. The church consists of a nave and chancel, with an opening from the latter, which is for a vestry or organ chamber. Altogether, seats will be afforded for 170 persons. An interesting feature of the restoration is the retention of the old Tudor roof of the chancel. In rebuilding the church, the old material is being re-used. The architect is Mr. Henry Stone, of London, and the builder is Mr. Saunders, of Maldon, the amount of the contract being 1,687*l*.

New Malden.—The family of the late Mr. J. C. Sim having decided to rebuild the chancel of Christ Church, New Malden, as a memorial to their father, and as it has long been felt that the accommodation in the church is quite inadequate to the requirements of the rapidly-increasing population, it has been decided to embrace the present opportunity of enlarging and improving the church. Plans and estimates have been submitted by Mr. Ewan Christian, which include the raising of the present roof, extending the church to the east, rebuilding the chancel, erection of a new vestry and organ-chamber, completion of organ, and the building of the south aisle. It is not intended, however, to carry all these improvements out at the present time. The eastward extension, vestry, organ-chamber, and completion of the organ will, it is estimated, cost about 1,500*l*. The rebuilding of the chancel will cost about 850*l*. The church will then provide accommodation for 469 persons, or about 160 more than at present.

West Dulwich.—The foundation stone of a

new church at West Dulwich, dedicated to St. Emanuel, has been laid by Mr. Frederick Peek. The cost is estimated at 9,000*l.*

Gatten.—St. Paul's Church, Gatten, near Shanklin, Isle of Wight, has been consecrated. The style is Early English, and at present there are sittings for 370 persons; but when the church is finished there will be accommodation for 750. The church has an apsidal east end, and the aisles are carried round the east end, forming vestry, organ-chamber, and porch. Immediately above the communion-table are indented spaces, which will be fittingly filled; these are surmounted by an open arcade; and there is a clearstory of lancet windows. The nave is 26 ft. 6 in. wide, the aisles are 10 ft. in width, and the total height of the church is 56 ft. to the ridge. The roof is wagon-headed inside. The present building, from the communion-steps, is 56 ft. long, but when completed the church will be three more bays in length. The benches are open, and of pitch-pine. The floor, which is at present of Portland cement, is intended to be paved with tiles. According to the design, the west end will be elaborate, with lofty pinnacles. The architect is Mr. C. L. Luck, of London; the clerk of the works is Mr. W. H. Coussmaker, of Shanklin; and the builder, Mr. Robert Allen, of Sea View.

CHESTER CATHEDRAL.

SIR,—Having read the graphic and able account of the restoration of Chester Cathedral in the *Builder* of September 16th, entitled "The New Cathedral at Chester," I feel desirous of making a few remarks on one or two points therein which clash with my own views, though I cordially agree with it in the main. I had no wish of adding to what I have already advanced on the subject; but I cannot let the opportunity slip, which your article affords, of rendering my published views more complete and explicit, especially to my old friends, professional or non-professional, among the readers of the *Builder*, supposing I may so far obtrude upon your space.

In the first place, we differ as to the former state of the building, and consequently as to its need of restoration. I believe the writer has truly recorded his impressions or recollections of it; and I cannot dispute his word when he speaks of the "mass of nearly shapeless boulders to which the exterior had been mostly reduced." But, from some cause or other, we must have looked at the building with different eyes. After living some years in Chester before the commencement of the works, and seeing it nearly every day, I can conscientiously say that it never appeared to me but in a state in which I thought it highly desirable, in the interest of art and beauty, it should be preserved, and the portions of carving which have been left on the west front will show the quality of what still remained. I never was conscious of anything in the cathedral but a touching, almost pathetic, expression of age and endurance, bearing striking analogy to what interests and moves us in a feeling and venerable human face. These remarks apply emphatically to the tower, a feature of the cathedral and of the city which must dwell vividly in many memories, as nobody could fail to be impressed by its air of extreme antiquity and abandonment. Though its turrets had become truncated, there was a unique grandeur about it which the new one does not attempt to realise.

In the second place, while acknowledging the beautiful condition of our cathedrals generally by the weird markings of nature, the writer, I think, underrates its quality and æsthetic importance as a subject of gratification and study, and deems it more a thing for the artist to take note of than the architect, speaking of the preference of the latter for details. These are seldom so much wanting as they were at Chester, which the friability of the stone rendered an exceptional example. But with all due respect for mouldings, I think that any deficiency of these is generally amply compensated by the additional spirit and grace, and the infinite varieties of minute beauty, in texture and colour, which natural influences communicate. Now, though artist-painters, from greater intercourse with nature, are most appreciative of this beauty, yet, if architecture is the art of building beautifully, the architect, who is an artist, has good reason to take cognisance of it. Nay, being a beauty which inevitably attaches to buildings of a certain age in our climate, it should have for him a peculiar interest. Nature has given a finish to his work, and in it a lesson for his future guidance,—a lesson in ornamentation which no works of the Moors or any human design could yield.

The feeling or sentiment that appreciates this beauty, let me say, is that on which all poetry, art, and whatever administers to the higher needs of our nature is based, and is not a questionable thing at all,—not a myth, but a real element in human nature. Sentiment, as Rogers the poet once remarked to Shelley, may be the logic of a higher sphere.

I have not seen the interior of the Cathedral, or I should have been happy to bear testimony to its having been so tenderly treated as it seems to have been; and to the improvement which must have been effected by the restoration to it of the long-severed south transept. All the alterations and additions named must be deemed improvements, except the removal of the organ; the writer's remarks on which are very valuable, and will have their effect on future re-arrangements of cathedral interiors and planning of churches. He says the organ would best speak and combine with the voices in the centre. If so, in the centre it should have been placed. Though the Cathedral is not a music-hall, yet the organ, being for use, had the first claim to consideration. As the matter stands, a sacrifice has been made of utility to architectural effect,—a capital error, which will also appear if we view the question thus: The two sisters, Architecture and Music, are both there as handmaids to Religion. Which is the most directly aiding in the worship? Music unquestionably; and if so, the organ should have been placed where it would sound best,—the centre.

But I believe the central position of the organ needed not to interfere with the apparent length of the building; which would have been best felt or appreciated by an arched opening in the screen under the organ, or through the organ, if placed on the ground, giving a mere glimpse only of what was beyond.

His exception to the wooden vault may be just, but a wooden vault is not necessarily a sham or falsehood—as timber will serve a real practical purpose, employed on the same constructive principle as stone, to which it is only inferior in being combustible and less durable. If the roof is constructed on the vault principle, then the restoration of the flying buttresses was necessary, while it renders the exterior more complete, and does away with the unfinished appearance.

I am glad to hear of the intention to spare the cloister, the more as it is the realisation of a hope I expressed in print at or near the outset of the operations. The cloister, which seems as if it held the Middle Ages embalmed, is the most precious feature of the cathedral and of the city. It is a romance in stone, and one of the most graceful relics of antiquity in existence. It seems as if the very genius and spirit of picturesque beauty inform and shine through its aspect. Its escape from restoration is the redeeming feature of the transaction.

If I could feel sufficient interest in the present exterior of the cathedral, I should sympathise in the writer's hope that the project of capping the tower with a wooden spire was abandoned; and also in his dislike to the octagonal apse, with its surmounting pyramid, terminating the south aisle of the choir, and the conical finials, which flank the east gable of the chancel.

SAMUEL HUGGINS.

ANCIENT AND MODERN STANDARDS OF WEIGHTS AND MEASURES.

THE concluding lecture of the series given at South Kensington Museum in connexion with the loan collection of scientific instruments was delivered on the 28th ult. by Mr. Chisholm, the Warden of the Standards. For much of the following report we are indebted to the *Morning Post*.

Mr. Scott Russell occupied the chair. In introducing the lecturer, he said that perhaps many would wonder why it was so important to have the yard measure so exactly correct. He would therefore say that there was nothing but a yard stick wherewith to measure oceans and continents, and if the yard were but the one-thousandth of its length wrong that might lead to our ships in some parts of the world finding themselves twenty-four miles out from where, by calculation, they thought they were. There was nothing but the yard stick as a unit wherewith to measure the stars' distances, and it was almost impossible to calculate the errors that might be introduced by an almost microscopic mistake in the yard's length. The French had originated a new standard of length, namely, the ten-millionth part of a quarter of the girth of the earth, but they had made a mistake in their calculation, and their mètre was not therefore reliable. The yard measure was not invented by us, but had come down to us by tradition. No one was more competent than the lecturer to tell us how our present standards of measure came to be what they are.

Mr. Chisholm began by saying that the subject of the lecture was not weights and measures generally, but only standards of weights and measures. The subject even then was a large one, but he hoped to compress what he had to say into the time allotted. He proposed first to refer to the earliest standards of weights and measures; and to those systems of ancient countries from which there can be no doubt that all other systems have been derived, with the single exception of the decimal metric system, which is of an original character. The use of weights and measures must have been one of the earliest necessities of civilised life. Josephus mentions the Jewish tradition that Cain, after his wanderings, built a city in the land of Nod, and was the inventor of weights and measures. The extreme antiquity of the use of weights and measures is also shown by the fact that the ancient heathens attributed the origin of weights and measures to the gods; the Egyptians to their god, Theath or Theth; and the Greeks to Mercury. As regards the original standards of weights and measures, we learn from the most ancient records that the practice was to derive all other measures, as well as weights, from a recognised standard unit measure of length, and that the cube of this unit, or of a determinate aliquot part or multiple, formed the unit measure of capacity, and the weight of water or other liquid contained in the standard measure of capacity formed the unit of weight. We learn, too, not only from ancient records, but also from the very names of the measures of length, that the proportions of the human body were taken to form the scale of measures of length, and that the cubit, or average length from the point of a man's elbow to the extremity of his middle finger, was practically adopted as the most convenient standard unit of length. The following scale of these natural proportions of the human body was most generally recognised, the digit, or breadth of the middle part of the first joint of the fore-finger, being the lowest unit of the scale. The digit, 1 part; palm or handbreadth, 4 parts; span, 12 parts; foot, 16 parts; cubit, 24 parts; arm's length, or step, or single pace, 40 parts; double pace, or stride, 80 parts; fathom, or greatest length of extended arms to the tips of the fingers, equal to the height of a man, 96 parts. The cubit is the only measure mentioned in the book of Genesis as in use before the Flood. The earliest system of weights and measures of which we now have any knowledge were the analogous systems established in Chaldæa, Egypt, and Phœnicia. All these systems were based upon the cubit as the standard unit measure of length, and it is to these systems that the derivation of the weights and measures used in almost all civilised countries can be traced. Of these early systems, the Egyptian has probably had the greatest influence upon those of other countries. It is generally admitted that the Egyptian weights and measures passed into Asia and Judæa, as well as into Greece, and, with some modifications, extended to Italy, where they were adopted by the Romans, and subsequently by all European nations.

Mr. Chisholm gave at some length an account of the standards of Egypt, but time prevented more than a rapid glance at the measures of Greece and Rome. The old French foot, or *pied du roi*, is said traditionally to have been the length of Charlemagne's foot, as the English yard has been said to have been the length Henry I.'s arm. Six of these old French feet made the toise, which was made the standard unit of length in France early in the last century, and was used for measuring an arc of the meridian in Peru. The iron standard toise actually used became the legal standard measure of length in France until the mètre was substituted for it, being known as the *toise de Pérou*. It was the standard unit of length for all measurement of arcs of the meridian made in Europe. (The standard toise of the Ordnance Survey Department was exhibited here.) The English yard is very nearly the same length as double the

original cubit. It is very probable that the yard was derived from this early standard measure by the Anglo-Saxons, or at least from its being the length of double the natural cubit. There is not equally satisfactory evidence with regard to ancient standard weight. Our English standard units of measures of length and capacity and of weight, the yard, bushel, and pound, have come down to us from the Saxons, though some modification of the two last-mentioned units have since been made. The earliest recorded standard of length in this country was the yard, or gird, of the Saxon kings, kept at Winchester. King Edgar is recorded to have decreed, with the consent of his wites or council, that "the measure of Winchester shall be the standard." No change was made by the Normans in the Saxon system of weights and measures established in England; and by a statute of William the Conqueror, it was ordained that "the measures and weights shall be true and stamped in all parts of the country, as had before been established by law." The only change that appears to have been made at the Conquest was in the custody of the standards, which were transferred from Winchester to the Exchequer at Westminster, where they were placed under the custody of the King's chamberlains. The Exchequer itself was a Norman institution, and even up to the present time there may be seen at Rouen the ancient building of the Norman Exchequer, with the inscription upon it "Le père de l'exchequer de Londres." The English standards of weight and measure were deposited by the king's orders in a consecrated building, just as the standards of old times in ancient countries were placed in their temples. Together with the royal treasures, they were placed in the Crypt, Chapel of Edward the Confessor in the cloisters of Westminster Abbey, since known as the Pyx Chapel. This portion of the old Abbey of Westminster then became vested in the Sovereign, and has ever since been held by the officer who has had charge of the standards. Some of the old standards, which were not required for actual use, remained in the Pyx Chapel, up to the time of Mr. Chisholm's appointment. The office of the King's chamberlains, which was a part of the old Exchequer Office, was not abolished till 1826, when the custody of the standards was transferred to the auditor of the Exchequer. It was again transferred to the Controller General of the Exchequer in 1834, when the old establishment of the Exchequer was remodelled. In 1866 the Exchequer ceased to be a separate office for the Government, and was amalgamated with the Audit-office. The new office of the Warden of the Standards was created, in pursuance of recommendations of the Standard Commission, and to this office Mr. Chisholm was appointed, in consequence of his long experience as an Exchequer officer, which began before the chamberlains' office was abolished. The Exchequer standards became the Board of Trade standards, the new office being placed under the Board of Trade. These standards include also those of coinage, the standard trial plates for testing the gold and silver moneys coined at the Mint having been entrusted, together with the standards of weights and measures, to the same officer of the king. Certainly from the time of Edward III., and probably from the time of the Conquest, the standard trial plates were always kept in the Pyx Chapel, the custody and keys of which were also transferred to Mr. Chisholm. But he preferred to keep the standard trial plates, with the imperial standards of weights and measures, in the fire-proof strong-room at his office, which has been specially fitted up for their reception. They are kept there in fire-proof iron chests. There is every reason to believe that the standard yard of Henry VII. represents accurately the length of the old Anglo-Saxon yard. It does not differ from our present standard more than one foot-rule differs from another,—that is, it is about 0·01 in. shorter. The yard and the ell were originally the same measure in this country. From the period of the Conquest down to the reign of Richard II. the statutes of official documents were generally in Latin and sometimes in Norman-French, and the yard and ell (*virga* and *verge*, *ulna* and *aulne*) are used indiscriminately as the same unit of length. In the clause of Magna-Charta relating to weights and measures, the term *ulna* is used as the unit of length of cloth, whilst in Domesday Book, land measured by the yard or yard-land, is called *terra virgata*. The old English yard was extended to our later English cloth ell, first by making it only 1 in. longer. By the statute of Henry VIII., the measure of the cloth yard was declared to be a yard and an inch, or thumb's breadth. Having thus got this little addition to the yard, the next process was probably to make a cloth yard of 37 in. and add a hand's breadth, and by repeating this process to get a cloth ell of 45 in. in Queen Elizabeth's time. There was shown Queen Elizabeth's standard yard of 36 in. and ell of 45 in., both marked on the same bronze bar. The earliest standard of monetary weight in England was the old pound of the Saxon moneyers in use at the Mint before the Conquest. The only legal standard of this pound, of which any account has come down to us, was the Mint pound of the Tower of London, known as the Tower pound. It was of the same weight as the old apothecaries' or medicinal pound of Germany, and was equal to 5,400 of our later Troy or imperial grains. In 1842 an ancient weight of brass was discovered in the Pyx Chapel that weighed 5,409 Troy grains, and was evidently an old monetary pound, somewhat increased in weight from oxidation. This moneyers' pound was the ancient pound sterling of silver, divided into 20 shillings, each into 12d. or pennyweights. We find that up to the end of the reign of Edward III. the weight of all gold and silver articles in the King's Treasury was expressed in our old Exchequer records in pounds, shillings, and pence, *poise de la Towre* or *pois d'orfèvres*. The pennyweight contained 32 grains, and thus the Tower pound contained 7,680 monetary grains, or grains of wheat. The pennyweight was equal to 22½ Troy grains, which is the average weight of the Saxon and Norman coined silver pennies. The mark was two-thirds of the Tower pound, and was used for denoting both the weight and value of silver under the Norman Sovereign. It was equal to 3,600 Troy grains, and they did not sensibly differ from the ancient unit of money weight in Germany, known as the Cologne mark. The Tower pound ceased to be the legal mint weight in 1527 by an Ordnance of 18 Henry VIII., enacting that "The Pound Towre" shall be no more used and occupied, but "al maner of golde and sylver shall be wayed by the Pounde Troye, which maketh xii. oz. Troye, which excedith the Pounde Towre in weight iii. quarters of the oz." From this time to the present our system of coinage and of weighing gold and silver has been based on the pound Troy. Troy weight had, however, been introduced into England long before the reign of Henry VIII., and was certainly in general use there in the early part of Henry V., being mentioned in the Act 2 Henry V., cap. 4. In the Exchequer records the earliest mention of Troy weight is in 1 Henry IV. It is probable that it was brought into England from France during the wars and the English occupation under the Black Prince. Its name has been considered to have been derived from the French town of Troyes, where a celebrated fair was held. There was certainly a known *livre de Troyes* and *marc de Troyes*, and the recorded weight of the *marc de Troyes* was very nearly two-thirds of our Troy pound. The use of the systems of weights based on the Tower and the Troy pound was confined to the precious metals and drugs. The earliest standard of commercial weight in England was the merchant's pound—*libra mercatoria*. It is mentioned in a statute of 54 Henry III., as a pound of 25s. used for all other commodities than the precious metals and medicines. It consequently was equal to one-fourth more than the Tower pound, or to 6,750 Troy grains. There was also a merchant's pound weighing about 7,200 Troy grains, and was one-third more than the Tower pound, which was used in England, and still more in Scotland. The merchant's pound, whether of 6,750 or 7,200 Troy grains, was superseded in England by the avoirdupois pound of 7,000 Troy grains, which appears to have been in use here as early as the year 1303, as it is recited in a weights and measures statute of that year—31 Edward III. It was probably introduced from France about the same time as the Troy pound. The pound avoirdupois was evidently taken from the old French commercial pound of 16 ounces, used at that time in many parts of France. Our existing imperial standard pound can be clearly proved to be of the same standard avoirdupois pound of Edward III., and there are good grounds for believing that no substantial difference has occurred in its standard weight, or in that of the Troy pound, since these standards were originally established in this country. The avoirdupois system of weight was legalised in this country by a statute of Henry VIII., which is a curiosity in its way. It was thus:—"Beef, pork, mutton, and veal shall be sold by weight called *haver du pois*. No person shall take for a pound of beef or pork above one halfpenny, nor for a pound of mutton or veal above three farthings, and less in those countries where they are sold for less." It is upon evidence of this kind that the theory is founded of the value or purchasing-power of money having diminished about fifteen-fold in this country since the Conquest. As to our early English standard measures of capacity, it is stated in Magna Charta, "There shall be throughout our realm one measure of wine, one measure of ale, and one measure of corn." This would seem to imply that there were then three distinct standard measures of capacity. But the only one of which we now have any cognisance is the Winchester corn bushel, of a capacity of about 2,150½ cubic inches, together with the Winchester corn gallon of 272½ cubic inches, the later standard of which, constructed by Henry VII., still remains in the Standards Office. A standard ale-gallon of 282 cubic inches was added by Queen Elizabeth, and a standard wine-gallon of 231 cubic inches by Queen Anne. But all these standard measures of capacity were abolished in 1824, and the new imperial standard gallon, containing 10 lb. weight of water, and equal to about 272½ cubic inches, was made the standard of capacity for liquid measures, and the imperial standard bushel of eight gallons was made the standard for measuring dry commodities. A reference to Scotch and Irish standards concluded the lecture.

The Chairman, in offering the thanks of the audience, referred to the fact that this was the last of twenty-nine lectures given by gentlemen who had generously placed their gratuitous services at the disposal of the committee of management. With regard to the collection of scientific instruments, he hoped a permanent museum would be formed.

Some one from the body of the room, who, instead of giving his name, said he was No. 5 in the roll of those who had years ago joined the Mechanics' Institute, said he wished to bear testimony to the great value the lectures had been to working men.

HEALTH AND SEWAGE OF TOWNS.

SIR,—In the general interest of public health, the council of the Society of Arts appeal to the inhabitants of the metropolitan districts, and to the public generally, to send to the Society evidence of cases showing the various evils which have occurred from the present imperfect system of the drainage of houses. At the Conference on the Health and Sewage of Towns, lately held at the Society, and attended by numerous representatives from various towns and localities in the kingdom, the importance of greater attention to the house drainage, as distinct from the sewerage, was especially brought to the notice of the Society.

It was pointed out that, however good the general sewerage might be, unless the drainage proper of the house and its connexion with the sewers were carefully planned, executed under due supervision, and maintained in proper order, there was imminent danger of typhoid and other diseases from the imperfect exclusion of sewer gas.

The council are well aware of the extensive powers which are given by Act of Parliament to vestries in the metropolitan district to deal with this matter. As regards buildings erected and in course of erection since 1855, the date of the Metropolis Local Management Acts, no doubt a large amount of supervision is exercised; plans of the house drainage are frequently deposited, and are open for inspection to the ratepayers. But the powers of the local authorities are rather remedial than preventive of disease, and are more or less imperfectly exercised. The evidence already collected shows that, in most of the metropolitan parishes, a small proportion of the total number of the houses in them has been properly dealt with, and consequently the plans of house-drainage are, on the whole, comparatively few even in parishes on the outskirts, where a considerable extension of building has taken place in the last few years. Neither owner nor lessee, nor intending purchaser, as regards houses built previous to 1855, unless in some few exceptional and accidental cases, has any means of ascertaining whether the house is or is not well drained, or properly connected with the sewers, and, if defective, how or in what direction amendment is to be sought. It is with a view to remedy this admitted evil, which reduces the usefulness of the main sewers on which millions have been spent, that the Council of the Society of Arts, in the interests of improved public health, have taken up this question. They have already memorialised the Metropolitan Board of Works on the subject, and they propose to address the President of the Local Government Board in reference both to the metropolis and to localities in other parts of the kingdom. The Council have sought for information and suggestions from the various metropolitan authorities having such matters in charge. They appreciate the valuable labours of these bodies, but they desire to draw public attention to what it appears to the Council needs further action on their parts, and they suggest that Parliament should be moved, if need be, to confer additional powers and responsibility on local authorities.

Under these circumstances, the Council invite communications both as to cases of evil arising under the present state of things in the metropolis and in the country generally, as well as any suggestions for remedy, and they will be glad to receive any such communications before the 20th of October next.

P. LE NEVE FOSTER, Secretary.

Miscellanea.

Insurance of Workmen's Furniture.—Mr. Baker, one of Her Majesty's Inspectors of Factories, in his last report to the Home Secretary, draws attention to a scheme of collective fire assurance for working men now in operation at the works of M. Engel Dollfus, at Mulhouse. It appears that M. Dollfus has for the past twelve years pursued a practice which has made insurance by working men so easy and satisfactory that at the present moment 283 of his hands, possessing about 417,000 francs in furniture are insured. "I obtained," says M. Dollfus, "from the Caisse Générale of Agricultural Assurance that it would construct a policy to include all those of our workmen who would insure their furniture; that it should receive the premiums in a mass; and that the insured should be covered wherever he might reside, on condition that he signified his change of abode, and inscribed the same on a special register." Only 106 of the *employés* of the firm at first took advantage of this collective scheme; but now, it is stated, 283 workmen have their furniture insured. During the twelve years in which the system has been at work in Mulhouse the loss by fire amounted to only 2,805 francs.

An Economical Ice-house.—Mr. W. W. Newman, writing in the *New York Tribune*, says:—An ice-house made of rails on the top of the ground in the open sun will preserve ice all summer if rain is kept from it, and a foot of sawdust is kept between it and the earth. The ice must be closely packed to prevent a continuous contact with air at every point. My ice-house stands in the sun on a dry knoll, is made of rough boards about 12 ft. by 16 ft., half-board length, 8 ft. high; it has a steep board roof, a north window, never shut in summer, with 8-in. or 12-in. upright studding inside; inside horizontal boarding, and filled between these two boardings with sawdust pounded down. The floor is made of pieces of rails, boards, &c., laid on the ground and cross-laid, and covered with a foot of sawdust. On this a layer of ice-cakes is placed, leaving a foot or more on the outside for sawdust, and sawdust is placed between the cakes that do not fit closely, and the last layer is well covered with the same non-conductor. In summer the sawdust is occasionally packed down, and large ice-blocks when wanted sawed into smaller pieces and repacked.

The Trade Unions Congress.—The annual session of the National Trades Congress was opened on Monday in the Mechanics' Institute, Newcastle-on-Tyne, under the presidency of Mr. J. C. Laird, president of the Newcastle and Gateshead Trades Council. The subjects for discussion included the following:—A Bill to amend the law of compensation for accidents, so that workmen might obtain damages; a Workshop Regulation Bill for women and children; the extension of the Factory Acts to bleaching and dyeing works; a reform of the magistracy, with special regard to the summary jurisdiction of magistrates; the reform of the Jury Laws, so as to admit workmen as jurymen; the extension of the Employers and Workmen Act to seamen; reform of the Patent Law; reconstruction of the Small Penalties Act; restriction of imprisonment; and an Act to prevent truck by making compulsory weekly payment to workmen in the current coin of the realm. The Committee, in reviewing the depressed condition of trade, express a hope that whenever any attempt is made to increase the working hours the men will resolutely oppose it by every legitimate means at their command. There are 119 delegates on the list, most of whom were present.

A Tight Hand.—The *Cornish Telegraph* says that the Redruth surveyor is not at all likely to pay workmen a fraction more than they ought to receive. He knows, so to speak, the exact amount of pressure to the square inch in each labourer, and he pays according to strength, industry, and skill. Hence we find some of the workmen receiving 3s. per day; others, 2s. 10d.; others, 2s. 6d.; while one or two get only 2s. The parishioners may well believe these men fully earn what they receive. Were they disposed to skulk occasionally it would be almost impossible to do so, for Mr. Hicks, rising even before the lark, closely pursues the hands during the whole of the live-long day. No overseer of a diamond field ever watched his underlings more keenly and constantly than our ubiquitous local surveyor. And in this way alone he has effected a considerable saving of money.

New Slaughter-house at Turriff.—A large slaughter-house, to be used in common by the butchers of the town, is in course of erection at Turriff, Banffshire. The building is situated in the Horse Market stance, beside the Market Hill, and stands high. The extreme length of the building is 80 ft., with a front elevation of 50 ft., and the extreme width 20 ft. This is divided into five killing-rooms or compartments, four of which are of equal size, 13 ft. long by 16 ft. 4 in. in width. The fifth is much larger than the others, being 25 ft. long by 16 ft. 4 in. in width, with ample accommodation, and hanging-room for a number of beasts. All the compartments are provided with ventilators on the roof, and each has a distinct conveyance-pipe to the cess-pool. At the back of the building are sites laid off for byres. Mr. Duncan was the architect, and the contractors were:—For mason work, Messrs. Fordyce & Son; carpenter work, Mr. Clark, Newmill, Auchterless; and slater work, Mr. Gillespie, Turriff. The cost will be about 400*l*.

Ancient Wall Paintings at Cropredy.—An interesting discovery has been made in the fine old church at Cropredy, which is at present undergoing restoration. In clearing the plaster of the chancel and north aisle it was found that underneath the successive coats of whitewash there still remained considerable traces of the fresco painting with which the church was originally adorned. On the chancel, so far, only portions of leaves and interlacing patterns have been found, but over and near the north door of the church representations of figures have been laid bare with half-obliterated texts in black letter. Some of these are enclosed in a kind of medallion formed by interwoven patterns, and appear to represent on one side the seven deadly sins, viz., pride, anger, avarice, lust, gluttony and drunkenness, envy, sloth. In each an attendant demon is waiting on the sinner. Parallel with these are apparently the seven works of mercy, with angels instead of devils.

The Preservation of Clapham Common.—The Enclosure Commissioners for England and Wales, under the Metropolitan Commons Act, 1866, and Metropolitan Commons Amendment Act, 1869, have duly certified a scheme for placing Clapham Common under the control of the local board. Briefly summarised, it is as follows:—The common, which is 220 acres in extent, has been purchased for a sum of 18,000*l*., and is to be dedicated to the use and recreation of the public for ever. The Board may drain, plant, and ornament the common as necessary; but no houses shall ever be built thereon, except lodges necessary for its maintenance. Arrangements shall be made for the accommodation of equestrians, and certain parts of the common are to be set aside for cricket, football, &c., and the intolerable nuisance caused by carpet-beaters, who flock to the common from all quarters of the southern portion of the metropolis, will be done away with.

Pier Extension at Woolwich Arsenal.—In order to ship the 81-ton gun for conveyance to Shoeburyness for further trials, it has been necessary to extend the pier at the Arsenal. The pier extension consists of a separate approach designed to carry guns of 120 tons weight, and it is built on cast-iron screw piles filled with concrete. These piles are from 3 ft. to 5 ft. in diameter, and are screwed about 4 ft. into the gravel bed of the river. The traffic is along a line of rails carried over the pile-heads on girders, and at the extremity, where the crane is fixed, there are twelve of these piles arranged in a circle round a larger one to bear the burden. Every pile has been tested with a dead load of 135 tons. The extension of the pier was designed by Col. Inglis, R.E., director of iron constructions at the War Office, in consultation with Col. Scratchley, R.E., inspector of works at the Arsenal, who supervised the work.

Thunderstorms.—At Quarrington, Durham, an alarming thunderstorm broke over the village about noon on Sunday. The lightning, striking the cottage occupied by Thomas Knox, a pitman, who, with wife and family, was indoors, the chimney crashed through the roof, carrying away the joists and destroying nearly everything upstairs and down, but, marvellous to relate, all the six inmates escaped with only a severe fright. Ralph Tarpin, who was standing at a neighbouring door, was hurled 10 yards into an adjacent cottage with comparatively slight injury. —— At King's Lynn the lofty central lantern-tower, all that remains of the church of the Grey Friars, built in 1264, was slightly struck by lightning on Sunday night.

Westminster Embankment.—The surveyor of the Metropolitan Board of Works has inspected the line of the proposed new street from Abingdon-street, Westminster, to Millbank Penitentiary, with the object of preparing plans for the embankment of the river between those points, it being the intention of the Metropolitan Board of Works to apply to Parliament to construct the works at a cost of 333,000*l*. The proposed embankment will join the embankment recently constructed by the Government adjacent to the Houses of Parliament, and will be continued on to Millbank. When completed, this would give a continuous available embankment of the river for nearly four miles from Blackfriars Bridge to Chelsea, were it not cut off by Westminster Bridge and the Houses of Parliament.

The Locksmiths' Strike at Willenhall.—A meeting of the brass padlock-makers, who are now on strike for an advance of 10 per cent. in their wages, was held on the 11th inst. The announcement was made that two leading firms in Willenhall were giving the 10 per cent. rise, and the following resolution was adopted:—"That because two respectable employers in our trade can afford, and have consented to pay, the 10 per cent. advance to their workmen, this meeting has come to the conclusion not to return to work until the same advance is conceded to us." It was afterwards resolved:—"That this meeting is quite willing to have this wages dispute in our trade settled by arbitration should the employers feel so disposed, and that our secretary be requested to convey this resolution to the masters' secretary."

Ecclesiastical Dilapidations.—On the 15th inst. a meeting of archdeacons and rural deans was held in Wells, under the presidency of the Bishop of Bath and Wells. The meeting was called for the purpose of electing surveyors of ecclesiastical dilapidations for the diocese. The three gentlemen at present filling the office of surveyors were originally appointed for five years, and they were now re-elected, but only for two years, the general opinion being that a change in the law would be made before very long. A committee, including the Archdeacons of Wells, Taunton, and Bath, and six rural deans, was appointed to consider the Report of the Select Committee of the House of Commons on Ecclesiastical Dilapidations, and report thereon to the bishop.

Rodmersham Vicarage.—A new vicarage has been built at Rodmersham. There are nine rooms on the ground-floor, comprising reception-room (16 ft. by 15 ft.), with bay-window, drawing-room (18 ft. 6 in. by 15 ft.), dining-room, study, kitchen, scullery, vestibule, and hall. There are seven bedrooms on the first floor, besides dressing-room and bath-room. The architect is Mr. W. Barber, of London, and the builder and contractor, Mr. John Seager, of Cryall's Lodge, Borden.

New Synagogue at Canonbury.—On the 17th inst., a new temporary iron building, in Mildmay-road, Canonbury, was dedicated as a synagogue. The permanent synagogue, which it is intended shortly to erect on the site of the temporary building, will cost nearly 4,000*l*. The temporary building has been erected by Mr. Kent, of Euston-road, under the superintendence of the architect, Mr. J. Spielman, the fittings being supplied by Mr. Knight, of Praed-street, Paddington.

Belgian Iron Girders.—We are informed that Mr. Thos. Scott, iron merchant, Edinburgh, has secured the contract for the supply of 400 tons of iron girders to be used in the construction of St. Enoch Station, Glasgow. Notwithstanding the depressed state of the iron trade here, it is stated these girders will be made in Belgium, and brought over here and delivered in Glasgow at a considerably lower price than they could be produced at home.

Monument to King Robert the Bruce.—The monument to King Robert the Bruce has been entrusted for execution to Mr. Andrew Currie, the sculptor of the monument in Ettrick Forest to Mungo Park and the poet Hogg. The monument will mainly consist of a colossal statue of the king, sheathing his sword in the moment of victory. It was designed by Mr. George Cruikshank.

South Kensington Museum.—The number of visitors at present appears to be far above the average. The number given for the week ending September 16 is 29,988:—the average of corresponding week in former years being stated at 16,634.

A Terrible Fall occurred at a new building in Holborn on Saturday, a little east of Chancery-lane. A man named Martin, a foreman carpenter, was on the roof of the structure in question, giving directions to some men under his charge. Turning suddenly round he lost his balance and pitched headlong down through the building, a distance of about 70 ft., falling upon the stones in the basement. He was conveyed to St. Bartholomew's hospital, but he died on the way.

Arbitration Case at Bradford.—The award in an arbitration case between the Midland Railway Company and the owners of property required for station purposes at Bradford has been made. There were 8,000 yards of land, for which the owners claimed 139,000*l*. The company estimated the value at 82,000*l*., and the umpire, Mr. Pownall, awarded 88,472*l*.

Howard Association.—The report of this Association for September, 1876, shows the various directions in which it has moved during the past year. The Association maintains its belief that Congregate Labour of Convicts can be pursued with advantage only in the case of carefully selected and classified prisoners.

The Newcastle Assize Courts.—We have received several letters commenting strongly on the action taken by Sir Gilbert Scott in this matter. We think it likely, however, that the circumstances which led to the correspondence may not be before the public, and decline, therefore, to publish our correspondents' observations.

An Example.—The Prussian Government has instituted an inquiry into the condition of the theatres in Prussia, and the advisability of establishing an academy of the dramatic arts, endowed by Government. Something of this kind for England we have long asked for.

Weston-super-Mare.—Mr. Henry Pethick, of Clifton, is about to erect a residence on a portion of the Montpelier Estate, adjoining the upper Bristol-road, the contract being entrusted to Mr. John Hando, of Bristol. The architects are Messrs. Wills & Voisey, of Park-street, Bristol.

TENDERS

For new baths, laundry, &c., for the Imperial Hotel Company, Great Malvern. Ironfounder's, smith's, and plumber's work not included. Messrs. Haddon Bros., architects:—

Broad	£2,312 10 0
Porter	2,100 0 0
Everal	1,870 0 0
Smart	1,800 0 0
Mills	1,663 2 1
Inwood	1,625 0 0
Garbutt	1,535 12 9

For new house at the Wyche Point, Malvern, for Mr. J. S. Canning. Messrs. Haddon Bros., architects:—

Collins & Cullis	£3,650 0 0
Porter	3,630 0 0
Jones	3,550 0 0
Garbutt	3,527 0 0
Everal	3,500 0 0
Osborn (accepted)	3,250 0 0

For the Langley Schools, for 500 children, for the Dawley (Salop) School Board. Teachers' residences not included. Messrs. Haddon Bros., architects:—

	School Buildings.	Boundaries.
Morgan	£3,656 8 0	£224 0 0
Nevett Brothers	2,696 0 0	481 0 0
Rushton	2,943 5 1	233 0 0
Bowers	2,662 5 2	246 14 0
W. & J. Wellington	2,575 0 0	320 0 0
Welsh	2,500 0 0	230 0 0
Patterson & Son*	2,386 0 0	190 0 0

* Accepted.

For new buildings for the Herefordshire and District Working Boys' Home. Messrs. Haddon Bros., architects:—

Welsh	£2,245 0 0
Griffiths	1,975 0 0
Bowers	1,900 0 0
Ford	1,760 0 0
Lewis (accepted)	1,750 0 0

For new school buildings and teachers' residence, at Genfron, for the Nantmel School Board. Messrs. Haddon Bros., architects:—

Stephens & Briston	£1,379 7 6
Hurst	1,189 0 0
Morgan	1,029 19 6
Evans (accepted)	1,027 10 1

For erection of house and stables, Wood Lee Estate, Egham, Surrey, for Mr. John King, Farlow. Mr. Robert P. Notley, architect. Quantities by Messrs. Linsdell & Giffard:—

	House.	Stables.
Haward Bros.	£5,361	£1,007
Falkner	4,778	878
Bangs & Co.	4,523	1,115
Pither	4,076	889
Browne & Robinson	4,343	1,068
Oades	4,294	999
Messom	4,415	822

For new school buildings, with teacher's residence, for the Avenbury (near Bromyard) School Board. Messrs. Haddon Bros., architects:—

Rouse	£950 0 0
Dixon	926 0 0
Kings	889 11 11
Turbill (accepted)	784 10 0

For new story, at No. 116, High-street, Shoreditch. Mr. Horace T. Bonner, architect:—

Steed	£248 0 0
Shurmur	240 0 0
Whales	219 17 0
Allen	205 0 0
Shingfield	190 0 0
Manning & Dowdney (accepted)	165 0 0

For rebuilding Nos. 28, 29, 30, and 31, Camomile-street. Quantities supplied by Mr. R. W. Griffiths. Mr. Wm. C. Banks, architect:—

Staines & Son	£5,282 0 0
Bangs & Co.	5,251 0 0
Hart & Son	5,234 0 0
Oliver	5,100 0 0
Rider & Son	5,053 0 0
Nightingale	4,975 0 0
Sharpington & Cole	4,836 0 0
W. & F. Croaker	4,562 0 0

For fittings at Nos. 65 and 66, Houndsditch, for Mr. Hyman A. Abrahams. Mr. Wm. C. Banks, architect:—

Drew	£1,195 10 0
Colls	1,130 0 0
Somerville & Smith	947 1 6
Nightingale (accepted)	897 0 0
Salter	893 0 0

For alteration to tower of Patshull Church. Quantities by Mr. R. W. Griffiths. Mr. Wm. C. Banks, architect:—

B. Graham & Son	£1,599 0 0

For external painting, repairs, &c., at St. Catherine's, Beckenham. Mr. Wm. C. Banks, architect:—

T. Graham	£237 17 0

For new dining-room, &c., Oakdene, Beckenham:—

Cooper	£688 0 0

For the erection of a residence on the Dudley-road, Tipton, for Mr. Daniel Dudley, jun. Messrs. Round & Beddoe, architects. Bricks and doors found by the proprietor:—

Tranter	£347 0 0
Round & Bagnall	315 0 0
Cox	303 14 0
Kendrick	297 10 0
Adams (accepted)	249 0 0

For alterations and additions to the Cock tavern, Camberwell-green. Mr. R. C. James, architect:—

Jackson & Todd	£1,150 0 0
Cook	1,110 0 0
Simpson	1,075 0 0
G. & S. Fisher	1,069 0 0
Cole	1,015 0 0
Cox	988 0 0

For alterations and additions to house, Bromley, Kent, for Mr. G. Weeks. Mr. A. G. Hennell, architect:—

Hooker	£2,420 0 0
Arnaud	2,338 0 0
Payne & Balding (accepted)	2,300 0 0

For alterations, stable buildings, greenhouse, &c., at Dulwich, for Mr. R. Peck. Mr. A. G. Hennell, architect:—

Amer	£888 0 0
Payne & Balding (accepted)	871 0 0

For cottages and farm buildings, at Farnborough, Kent, for Messrs. John Fox & Sons. Mr. G. St. Pierre Harris, architect:—

Payne & Balding (accepted)	£1,220 0 0

For alterations and additions to house, Elmstead-lane, Chislehurst, Kent:—

Payne & Balding (accepted)	£795 0 0

For alterations and new stables, at the Laurels, Bromley, Kent:—

Payne & Balding (accepted)	£328 0 0

For rebuilding the Independent Chapel, Wattisfield. Mr. Alfred Conder, architect:—

Day (accepted)	£940 0 0

For the erection of stables, cottage, lodge, and fences at Croydon. Mr. Gwyther, architect. Quantities supplied by Mr. C. Kirkby:—

Colls & Son	£2,653 0 0
Patrick & Sons	2,620 0 0
Gregory	2,585 0 0
Mason & Bristy	2,331 0 0
Smith	2,189 0 0

For alterations and additions to 202, Sloane-street:—

Simpson & Sons	£1,170 0 0
Turrall	1,120 0 0
Braid & Co.	1,100 0 0

For alterations and additions at Whitechapel Workhouse, Baker's-row. Mr. Longmore, architect:—

Andrews	£3,524 0 0
Crockett	3,300 0 0
Wood & Son	2,763 0 0
Stephenson	2,719 0 0
Braid & Co.	2,498 0 0
Judd & Hawkings	2,440 0 0
Scrivener & White	2,438 0 0
Hunt (accepted)	2,322 0 0

For new farm buildings, Heathrow (near Hounslow). Mr. C. J. Shoppee, architect:—

Briant	£1,115 0 0
Tayler	1,043 0 0
Larrett	984 15 0
Kearley	825 0 0
Hardy	789 0 0

For additions to the Green Man, Kingsbury, Hendon. Mr. C. J. Shoppee, architect:—

Willett	£1,097 0 0
Donne	1,031 10 0

For additions to the Surrey Arms, Hendon. Mr. C. J. Shoppee, architect:—

Willett	£341 0 0
Donne	329 10 0

For alterations, &c., at Grazeley Court, Reading. Mr. C. J. Shoppee, architect:—

Searle	£255 14 0

For rebuilding No. 28, Budge-row, Cannon-street, for Mr. O. H. Davis. Messrs. H. & J. D. Mathews, architects. Quantities supplied:—

Downs	£5,366 0 0
Dove Bros.	5,185 0 0
Moreland & Nixon	5,184 0 0
Brass	5,029 0 0
Gammon	5,000 0 0
Adamson	4,979 0 0
Morter	4,930 0 0
Hearle	4,895 0 0
Ashby & Horner	4,840 0 0
Conder	4,831 0 0
Sewell	4,768 0 0
Newman & Mann (accepted)	4,600 0 0

Iron Girders, Columns, and Fireproof Floors.

Moreland	£1,056 0 0
Homan & Rodgers (accepted)	864 0 0

For alterations and additions to Harley-street Chapel, Bow. Mr. T. L. Banks, architect. Quantities supplied by Messrs. Sargeant & Billings:—

Morter	£2,371 0 0
Bangs	2,323 0 0
Coleman	2,155 0 0
Toms	1,990 0 0

For alterations and additions to Wotton House, Dorking, for Mr. W. J. Evelyn. Mr. G. R. Redgrave, architect. Quantities supplied:—

Prebble & Co.	£2,280 0 0
Martin	2,250 0 0
Colls & Sons	2,150 0 0
Newton & Triggs	2,148 0 0
Putney	2,054 17 0
Grieve & Littlejohn	2,020 0 0
Hide & Co.	1,970 0 0
Beale	1,965 0 0
Stephenson	1,950 0 0
R. & E. Smith	1,940 0 0
Watson	1,898 0 0
Allen	1,870 0 0
Braid & Co.	1,750 0 0
Vincent	1,647 0 0
Warr	1,567 0 0
Timewell (accepted)	1,547 0 0

For the erection of dwellings, Peel-street, Notting-hill, for the National Dwellings Society (Limited). Mr. E. Evans Cronk, architect. Quantities supplied by Messrs. J. & A. E. Bull:—

Macey	£30,350 0 0
Downs & Co.	29,995 0 0
Rider & Sons	29,964 0 0
Allen & Sons	29,620 0 0
Bywaters	29,326 0 0
Hill, Higgs, & Hill	28,640 0 0
Shepherd	28,575 0 0
Patrick & Son	26,700 0 0
Perry & Co.	25,153 0 0

For the erection of a villa residence, at Brockley Park, Kent, for Mr. J. Frank. Mr. Henry Prior, architect:—

Stark	£1,046 0 0
Amer	1,020 0 0
Shapley (accepted)	993 0 0

For alterations and additions at Reindeer tavern, Eyelane, Peckham, for Mr. W. Wilson. Mr. Aldous, architect:—

Croaker	£494 0 0
Shapley	485 0 0

TO CORRESPONDENTS.

R. P. M.—S. H.—J. B.—L.—M. M.—F. P.—H. T. B.—A. C.—P. & B.—J. & H.—B. & Co.—G. & S. F.—Messrs. H.

We are compelled to decline pointing out books and giving addresses.

All statements of facts, lists of tenders, &c. must be accompanied by the name and address of the sender, not necessarily for publication.

NOTE.—The responsibility of signed articles, and papers read at public meetings, rests, of course, with the authors.

The Publisher cannot be responsible for TESTIMONIALS *left at the Office in reply to Advertisements, and strongly recommends that* COPIES ONLY *should be sent.*

Advertisements cannot be received for the current week's issue later than **THREE** o'clock p.m. *on THURSDAY.*

CHARGES FOR "WANTED" ADVERTISEMENTS.

SITUATIONS VACANT.

Six lines (about fifty words) or under	4s. 6d.
Each additional line (about ten words)	0s. 6d.

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PRE-PAYMENT IS ABSOLUTELY NECESSARY.

TERMS OF SUBSCRIPTION.

"THE BUILDER" is supplied *direct* from the Office, to residents in any part of the United Kingdom at the rate of 19s. per annum *Payable in Advance.*

Halfpenny stamps accepted for amounts under 5s. Any larger sum should be remitted by Money Order, payable at the Post Office, King-street, Covent-garden, W.C. to DOUGLAS FOURDRINIER.